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PTEMBER, 1955

RUBBER WORLD

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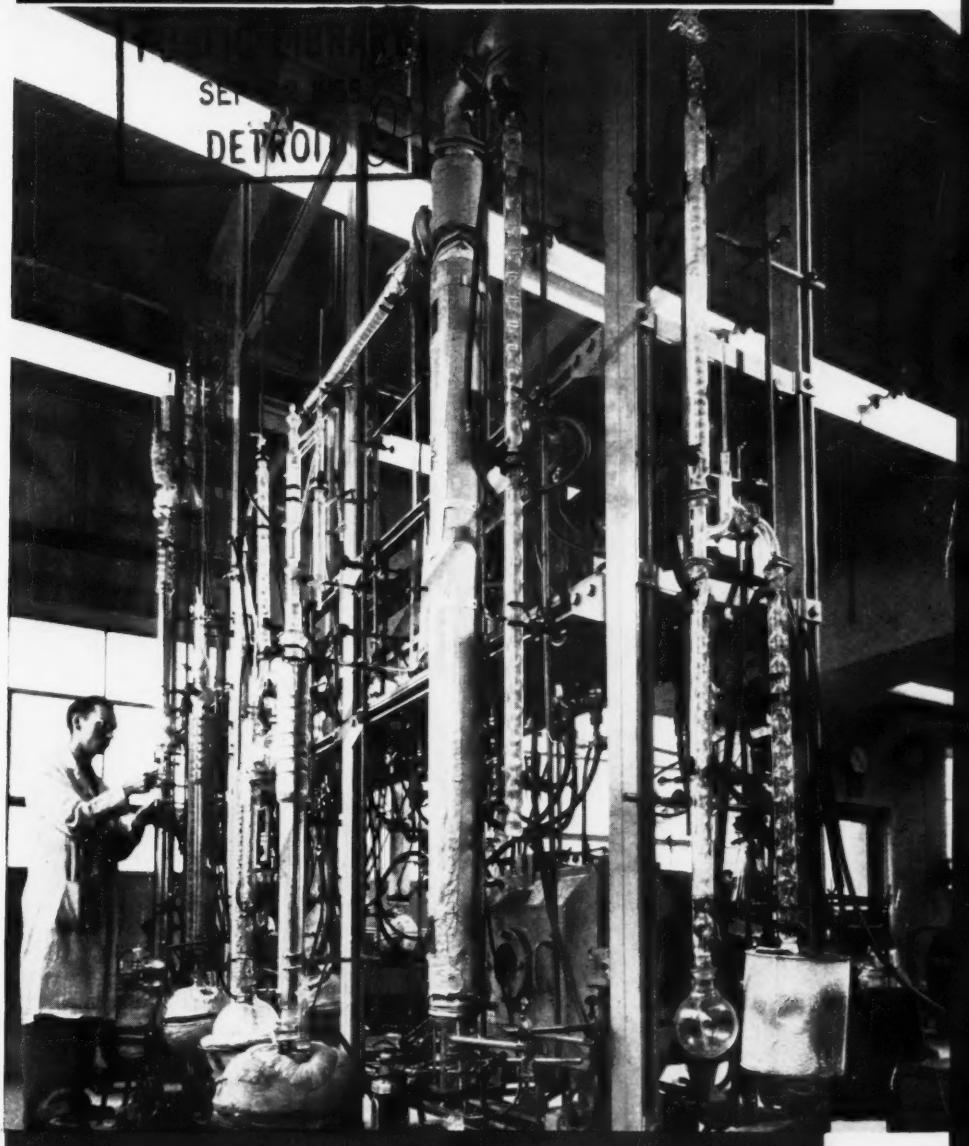

INDUSTRIAL RESEARCH AND DEVELOPMENT TECHNIQUES

See article by B. M. G. Zwicker, page 745

•

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continuous chemical
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r to reduce subsequent
l-plant expense

•

ILL BROTHERS

LICATION

For economy, ease in processing—

NEOPRENE TYPE WHV

It can be loaded heavily with oils and fillers to provide exceptional economy . . . very low swell in oils and solvents

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These low-cost neoprene stocks process well . . . have good physical properties

LITERATURE REFERENCES

BL-249—Practical Neoprene Compounds for Highly Competitive Products
BL-254—More Dollars from Neoprene
BOOK—"Mechanical Molded Goods." Page 95, 99 and 109.

Ask our technical representatives for copies if you have mislaid yours

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improves processing

Good-rite Resin 50—a thermoplastic reinforcing resin that is compatible with crude and American rubbers—offers the compounder many important advantages.

- ★ **Improves mixing, calendering, and extrusion characteristics of compounds to which it is added.**
- ★ **Easily handled; does not require masterbatching.**
- ★ **Makes premium quality compounds in all ranges of hardness.**
- ★ **Makes easy-to-extrude high-hardness compounds in full range of colors.**

Good-rite Resin 50 is produced as a finely divided, free-flowing, odorless white powder, easily blended with other polymers. To find out how Resin 50 will enable you to make *better* products at *lower costs*, please write Dept. CL-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

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You'll find Resin 50 in the recipe wherever the product needs superior flex life, hardness without sacrifice of strength, improved abrasion resistance, and light weight. Are any of your products listed here?

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- ★ **Shoe Soles, Safety Shoes**
- ★ **Golf Bag Bottoms, Club-heads**
- ★ **Wire & Cable Insulation**
- ★ **Battery Cases, Battery Caps**
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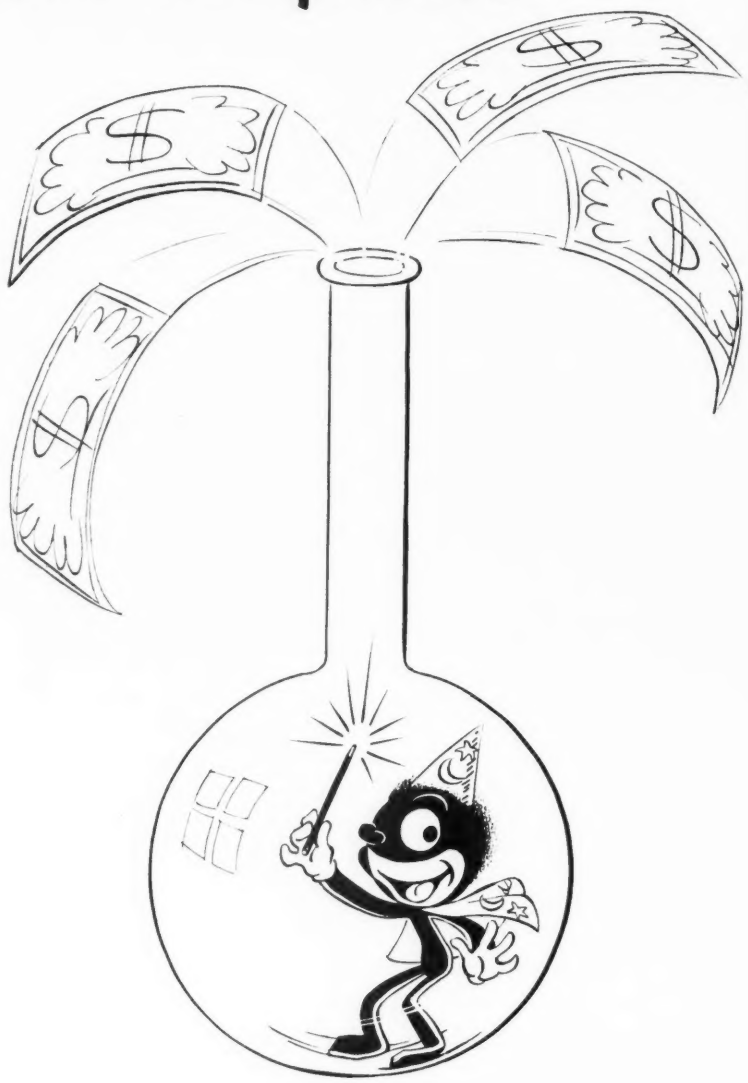

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with postformable sheets of new **Plio-Tuf C75**

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PLIO-TUF C75 is a brand-new, modified styrene resin—specifically designed for the calendering of sheets. It is an internally reinforced resin offering decided advantages over similar materials. It is a resin that will enable you to make a premium profit product on existent equipment.

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Why not learn more about how you can make the most of your calender with PLIO-TUF C75? Samples and technical help are yours by writing to:

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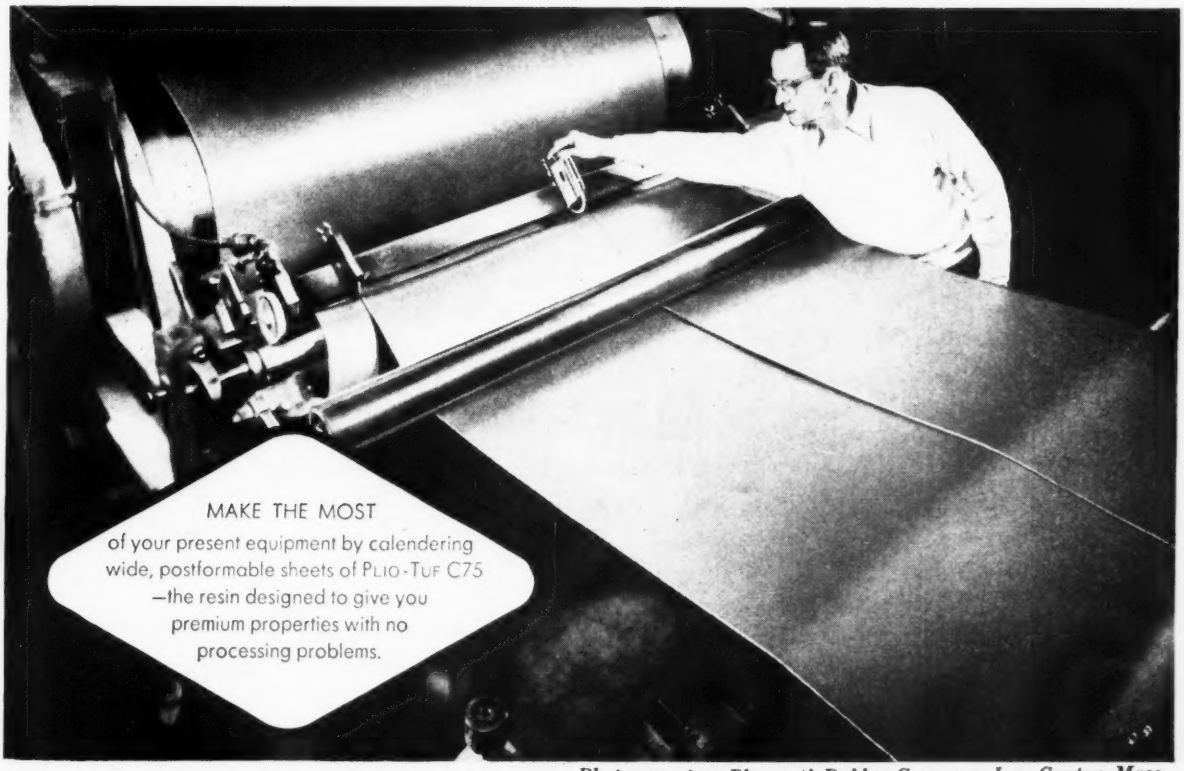
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of your present equipment by calendering wide, postformable sheets of PLIO-TUF C75 —the resin designed to give you premium properties with no processing problems.

Photos courtesy Plymouth Rubber Company, Inc., Canton, Mass.

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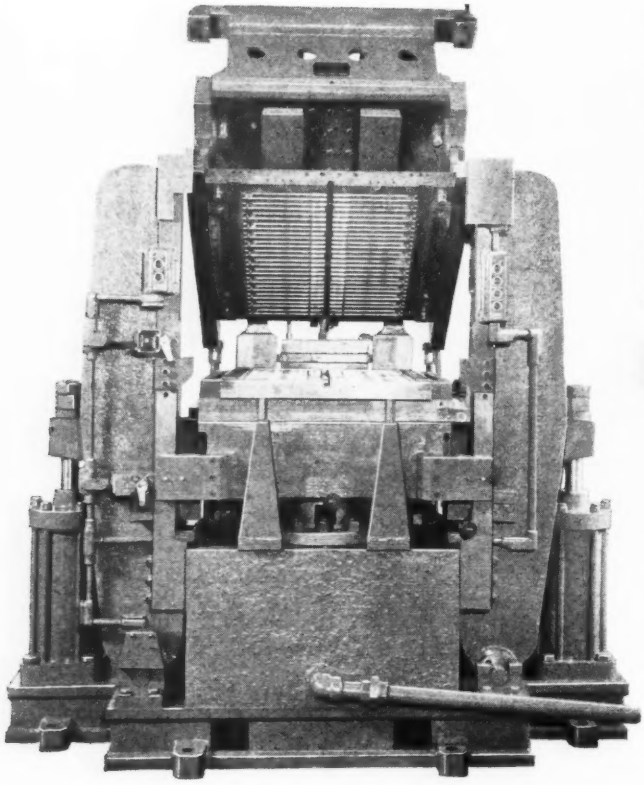


REMOVE THE WORK WITHOUT REMOVING THE MOLDS

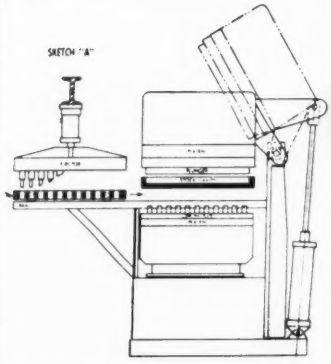
Molds fasten to platen. Jaws open — operator removes work. Molds are filled — press closes. High unit platen pressure.

Easy accessibility to all parts of mold and stock cavity, in combination with short ram stroke to minimize overall working cycle.

Useful for deep or shallow molding. Can be equipped for Transfer Molding. Operates off Centralized Hydraulic System or individual pumps. No heavy lifting or straining. No chance for off register of molds.

Hydraulic operation has the advantage of giving full pressure at any position of the ram during its working stroke.

Note: A movie film showing complete cycle operation available in 16 mm.



VERSATILITY

In this transfer m
operation, mold r
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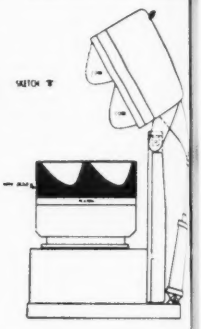
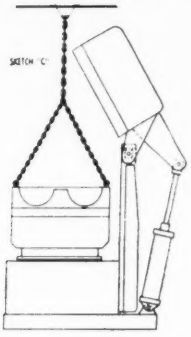
COMPRESSION MOLDING

Although deep molds must remain in press, ample working space is provided with minimum working stroke.



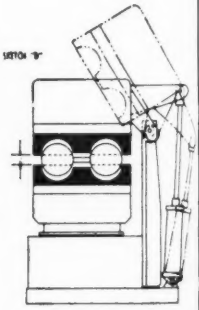


MOLD SET-U

Heavy molds co
set up in press
overhead hoist . . .
ing time and "ho
of expensive mold

SHORT STROKE

Actual power stroke of main ram is held to the minimum. 95% of working space (day light) is accomplished by quick acting tilting head. Only 3½" of ram travel required to actuate press.



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Today, the Port Neches plant continues in full production under private ownership and operation. Its services are being expanded to meet the needs of rubber users throughout industry.

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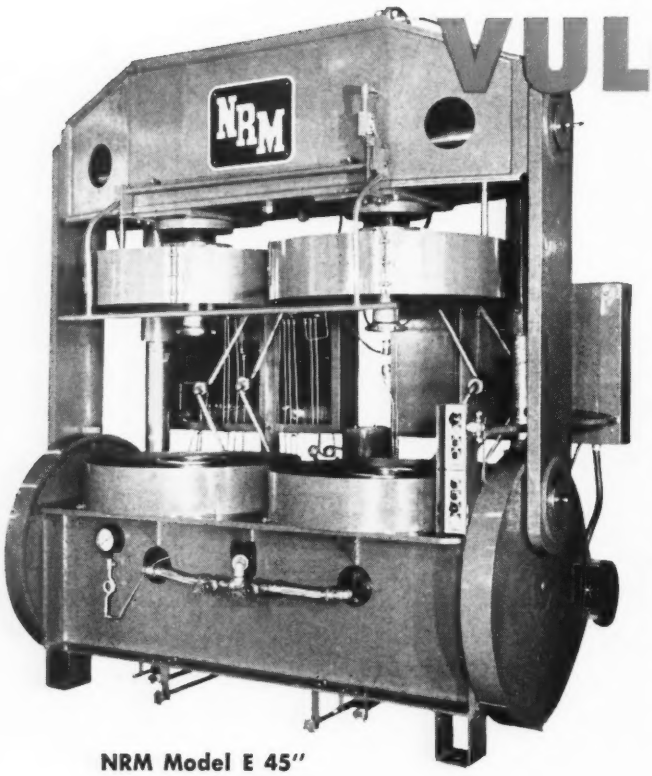
With the NRM 40" Packless *Autoform* VULCANIZER



NRM Model E 45" Packless Autoform VULCANIZER

- **LESS MAINTENANCE**
- **SIMPLER OPERATION**
- **MORE TURNS PER MOLD**

Faster, more economical and therefore more *profitable* shaping, bagging and curing of passenger and truck tires is made possible with the Model E 40" Packless Autoform Vulcanizer. Extremely simple in construction and method of operation, it cuts maintenance costs to bare minimums, and makes bladder assembly and mounting six times faster than with rod type presses. Up to 68 turns per mold is regularly obtained in 24 hours with automatic unloading on present day cure cycles.

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Autoforms are currently available in 40", 45", 50" and 55" dual-platen and dome types.

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Let us know your objectives in colored rubber goods—there's a Columbia-Southern pigment (or a combination) that will fit your needs. Write or telephone today to Rubber Pigments Department at our Pittsburgh address.

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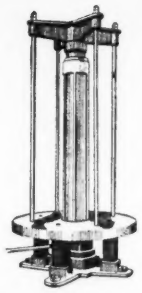
in the good old days



When it was necessary to reinforce the floor under the weight-type accumulator installation . . . when the maintenance gang held its breath to see if the old accumulator would rise far enough to keep pressure in the lines . . . when it was possible to keep packing on the accumulator ram only for a week or so

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Erie Foundry offers this compact, lightweight, minimum maintenance hydraulic power system with many worthwhile advantages:

a 10 h.p. electric motor which drives
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a small radial air compressor driven by
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a control unit—electric, of course.

It has safety controls for both high and low pressure oil systems.

This pictured ERIE Hydraulic Power System is designed to supply 6 314-ton rubber-molding presses having 18" stroke plus 6 lift tables all based on a 3 minute cycle.

Similar ERIE Hydraulic Power Systems are available in all sizes to suit your requirements.

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for bonding Natural, GR-S, and Butyl

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TY-PLY will adhere most vulcanizable rubber compounds to almost any clean metal surface

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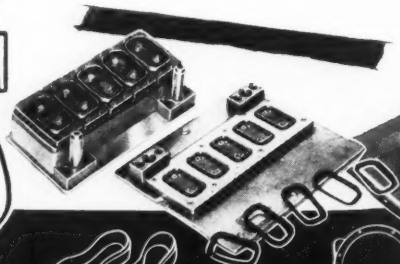

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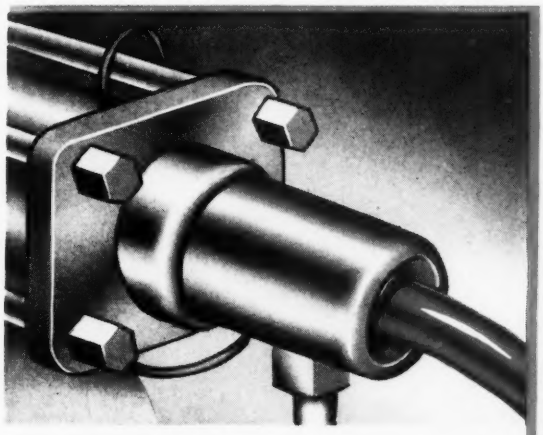

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PASTE - -

A "single package" stabilizer for high heat resistance plus good light stability . . . Contains cadmium and barium components and synergized chelating agent. Disperses easily in dry pre-blends, solutions and dispersions.

LIQUID - -

A synergized chelating agent.

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A metal bearing component of STABELAN HR paste.

STABELAN HR has been used with marked success in stabilizing all types of Vinyls containing organic and inorganic pigments.

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STABELAN E — Paste — Provides excellent stabilizing for ultra-violet and outdoor aging . . . It gives good light fastness and heat stability. Heat stability and transparency may be improved when Stabelan E is used with Stabelan HR Liquid. Gives films that do not "blush" or absorb water . . . It is compatible with all tested pigments — even organic reds hold their hue and age well . . . It does not cause plating on rolls.

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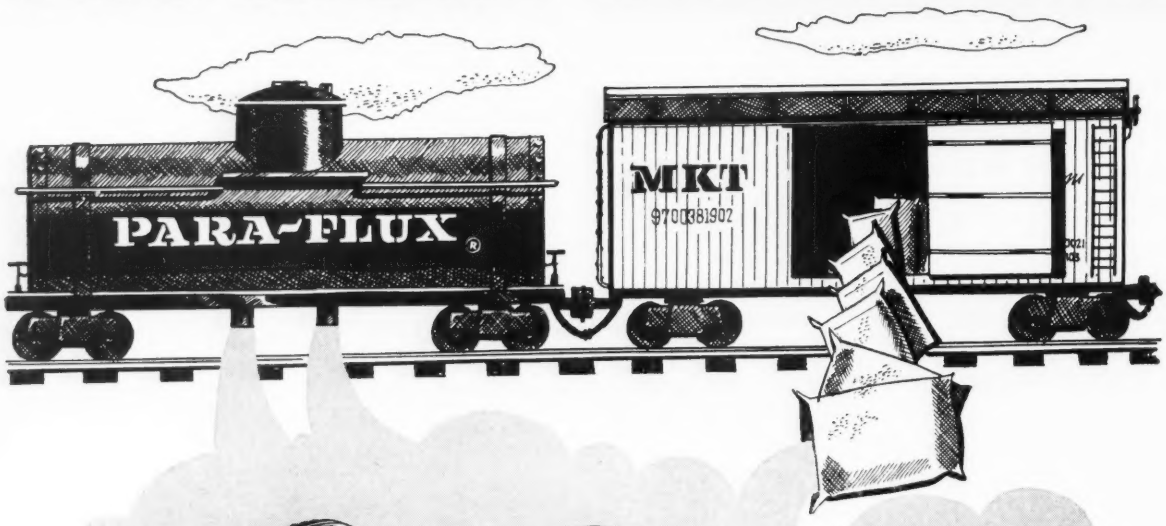

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THESE RUBBER
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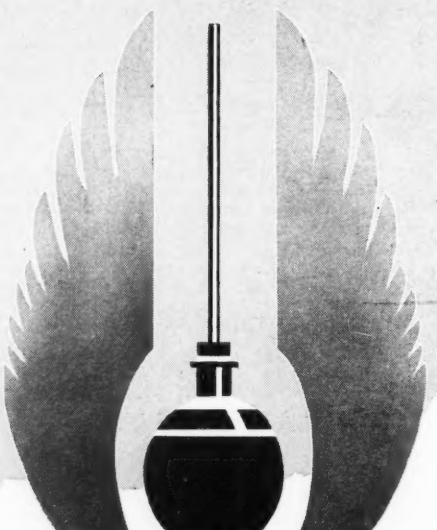

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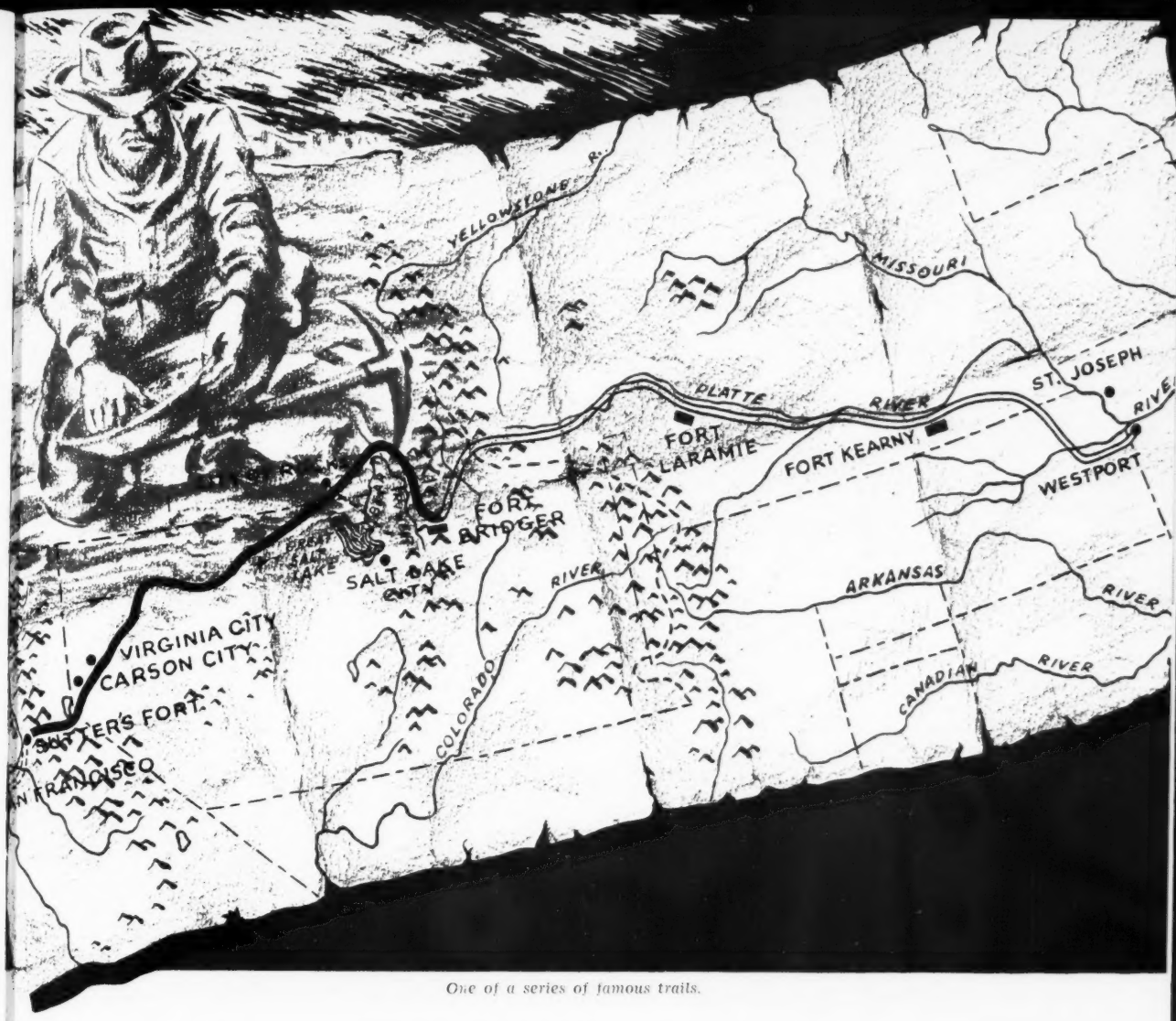


One of a series of famous trails.

The California Trail

Discovery of gold at Sutter's Mill in 1848 sent thousands westward. From every part of the nation and from overseas the adventurous raced to the California foothills to seek their fortune. Overland the journey followed the way earlier made by the Oregon settlers and the Mormons. Near the Snake River the trails parted, the California Trail swinging south to the gold fields.

Bennett Clark, of Booneville, Mo., wrote in his journal: "We saw the dust ascending to the skies, shewing that every avenue to the golden region was crowded with eager travellers to the Great El Dorada." Near the locality called City of Rocks, where the foregoing was written, Pegleg Smith, an old mountain man, saw the uncrowded days of the west which he once knew come to an end as he watched the gold seekers in an endless stream pass his cabin on Bear River.

A motorist on US 40, which follows part of the route of the old trail, cannot possibly realize the incredible hardships which the gold seekers endured. Where he today rides in comfort, the Forty Niners suffered from the relentless heat and the lack of water, and were in constant danger from the Indians.

California is a mecca for the tourist. The products of its land and factories roll forth every hour of the day, headed for the great markets to the eastward, their value far greater than the gold which lay in its streams and in its mountains.

How far man has progressed in his ability to transport himself and his goods. Neither the heat of the waterless desert nor the cold of the snow-filled mountain passes, nor the ruggedness of the terrain, restrain him in his journeys. The rubber tire takes him swiftly on his way.

The long-wearing qualities of the rubber tire are obtained from carbon black, which imparts durability. United Blacks, distributed throughout the world, are among the best in quality and performance, constantly developed to meet needs of the tire industry.

UNITED CARBON COMPANY, INC.

Kosmos 70, intermediate super abrasion (ISAF), is the finest quality furnace carbon black for natural and synthetic rubbers. It imparts maximum strength and extreme resistance to wear. It is also safe processing.

Kosmos 70 is a must for the better type passenger, truck, and tubeless tires and for tank tracks. It assures them phenomenal endurance and a long mileage record. Mechanical goods likewise draw on Kosmos 70.

Kosmos 70 and related Kosmos brands are key blacks with rubber compounders. They know by experience. Standardize on United Blacks to forge ahead.

UNITED CARBON COMPANY, INC.

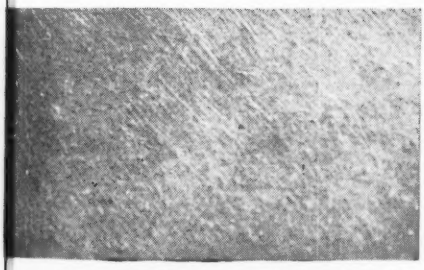
CHARLESTON 27, WEST VIRGINIA

NEW YORK AKRON CHICAGO BOSTON MEMPHIS

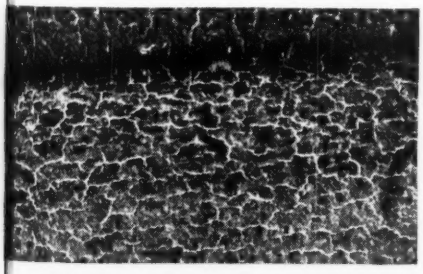
No sign of checking. The rubber insulation on this wire contains Sunoco Anti-Chek. Compare it with the sample at the right.

Surface checking is clearly evident in the rubber covering of this wire—which does not contain Sunoco Anti-Chek.

STOP SURFACE CHECKING AND CRACKING WITH SUNOCO ANTI-CHEK



Sunoco Anti-Chek keeps black sidewalls smooth... even after prolonged storage.



Notice the cracking and checking of the sidewall on this tire which does not contain Sunoco Anti-Chek.

Sunoco Anti-Chek is unique . . . there's no other anti-checking wax like it. It's a narrow-cut primary product, not a blend. It is completely controlled from crude oil to finished product by the same company that originally developed it. And it is made in the most flexible wax plant in the world. To you this means a completely uniform product that can be depended on for the same excellent results tomorrow, next year, 10 years from now!

Detailed information on the many advantages of Sunoco Anti-Chek is given in a new technical bulletin. To get a copy, call your Sun Oil Company representative or write Dept. RW-9.

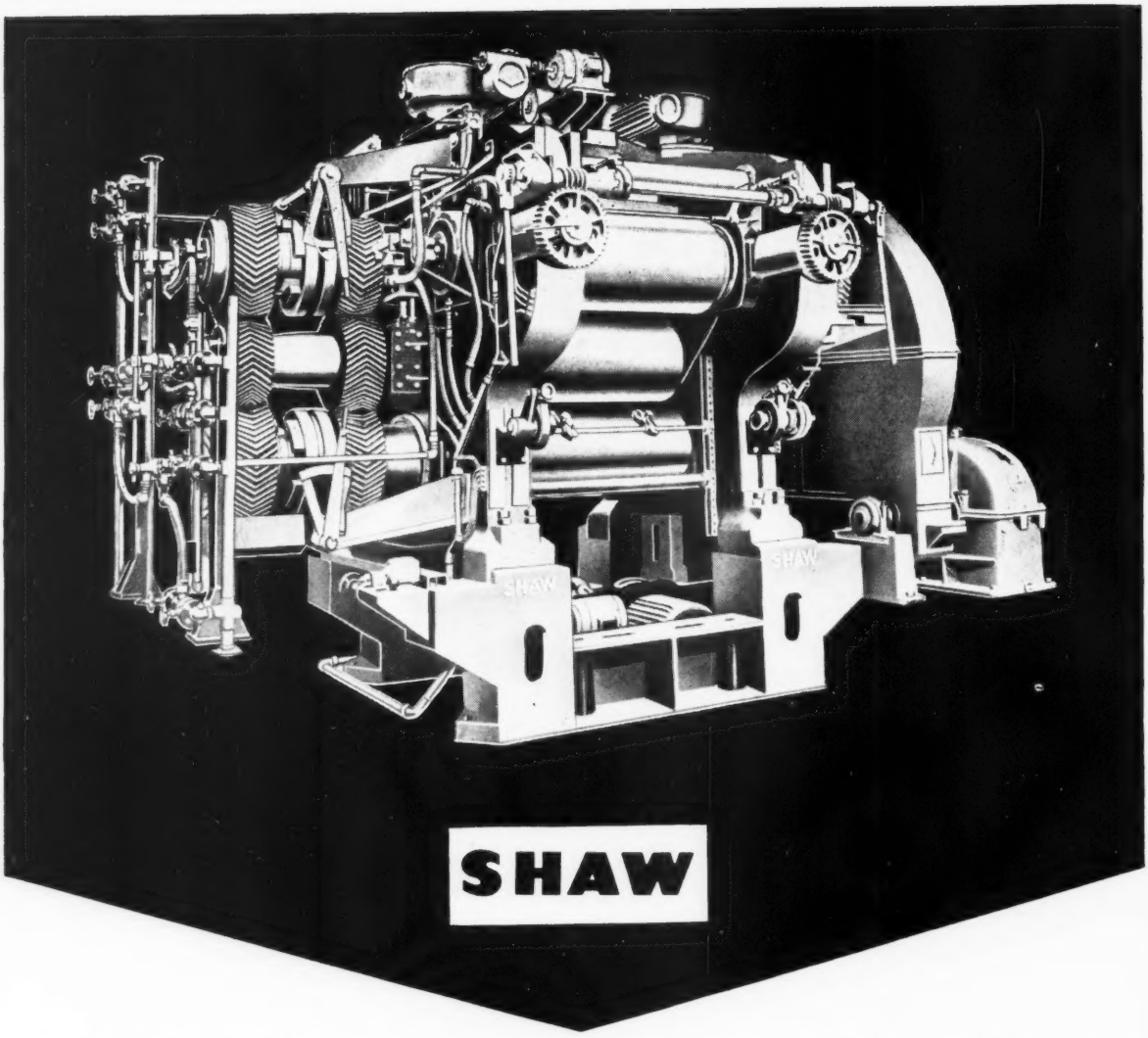
INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline



SHAW

PRECISION CALENDERS

Well in front of contemporary designs of machinery for the Rubber Industry, SHAW Calenders are the latest word for flawless production, complete reliability, and very long life. They are supplied with 3 or 4 bowls for all types of Synthetic and Rubber materials. Among the many refinements included in the design of this outstanding machine are: bored and/or drilled rolls for heating and cooling, flood lubrication to the Roll Bearings, and hydraulically operated zero clearance.

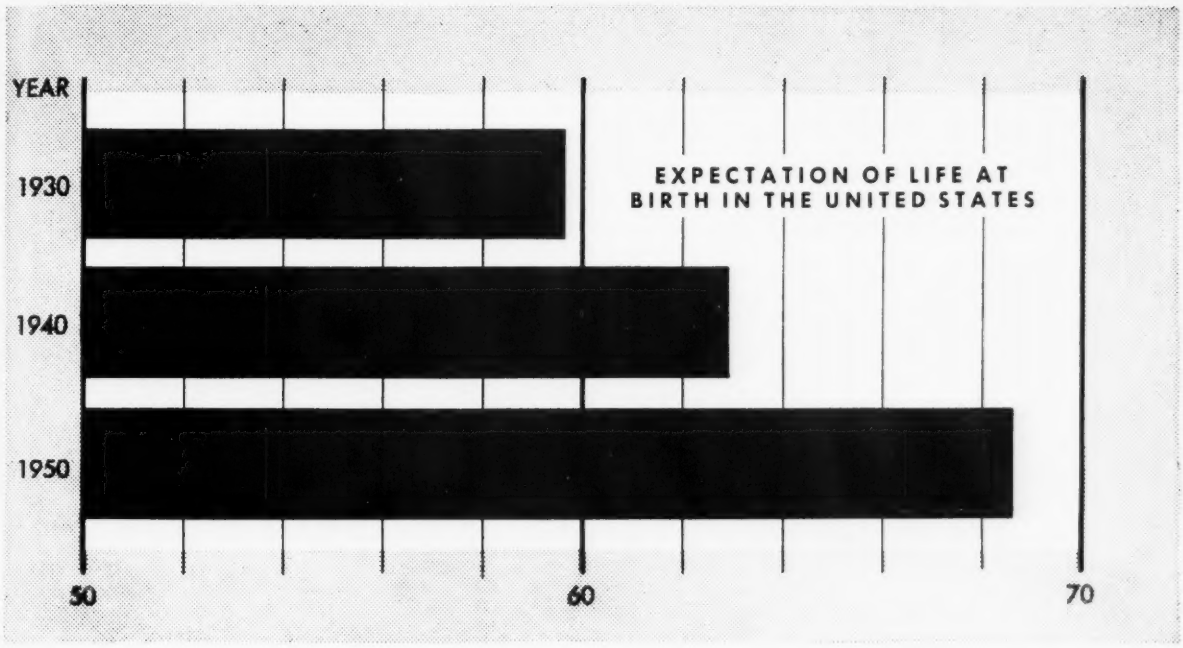
FRANCIS SHAW & COMPANY LIMITED MANCHESTER 11 ENGLAND

LONDON OFFICE: 34 VICTORIA STREET LONDON SW1

Enquiries to:

FRANCIS SHAW (CANADA) LIMITED GRAHAM'S LANE BURLINGTON ONTARIO CANADA

TELEPHONE: NELSON 4-2250 *TELEGRAMS:* CALENDER BURLINGTON ONTARIO



WHAT IS THE LIFE EXPECTANCY *... of YOUR PLASTIC?*

High volatile monomeric plasticizers used twenty years ago resulted in very short lived plastics. Technological advances, primarily in the kinds and types of plasticizers used, have allowed longer life to be built into plastics.

HARFLEX® 300 is a new and truly permanent plasticizer developed by Harchem. It is used alone for plasticizing PVC resins, eliminating the need for fugitive plasticizers.

Plastics made with HARFLEX® 300 as the sole plasticizer have a given tensile strength with the use of less material, are non-migratory, and have excellent low temperature properties.

HARFLEX® 300, when used in your product, results in quicker blending and easy processing. It can be the answer to one of your problems. Write for a sample and full information.

COLUMBIAN CARBON COMPANY, DISTRIBUTOR TO THE RUBBER INDUSTRY

SEBACATES
PHTHALATES
ADIPATES

HARCHEM

the key to HARCHEM® better plastics

HARCHEM DIVISION

WALLACE & TIERNAN, INC.
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY
CANADIAN DISTRIBUTOR: W. C. HARDESTY CO. OF CANADA LTD.—TORONTO

H-6-R

one woman tells another
how white and bright
her rainwear is, when it's
made with TITANOX®!!!
if you make white goods
like those in these pictures,
come to TITANOX
for the best in TiO_2.
TITANOX white pigments
are compatible with
all types of rubber and plastics!
why don't you try them?

TITANIUM PIGMENT CORPORATION • 111 BROADWAY, N.Y. 6, N.Y.

Subsidiary of National Lead Company

Atlanta • Boston • Chicago • Cleveland • Houston • Los Angeles • Philadelphia • Pittsburgh • Portland • San Francisco

In Canada: Canadian Titanium Pigments Limited—Montreal • Toronto

3317

Philprene®

-a new name in rubber

CURRENT PHILPRENES	*Each is identical to former GR-S with the same numerical designation except 1605 and 1803 as noted below*		
	HOT	COLD	COLD OIL EXTENDED
	PHILPRENE 1000 PHILPRENE 1001 PHILPRENE 1006 PHILPRENE 1009 PHILPRENE 1010 PHILPRENE 1018 PHILPRENE 1019	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503 NOTE: PHILPRENE 1019 AND 1503 ARE ESPECIALLY DESIGNED FOR THE WIRE AND CABLE INDUSTRY	PHILPRENE 1703 PHILPRENE 1706 PHILPRENE 1708 PHILPRENE 1711 PHILPRENE 1712
	PHILPRENE 1100 PHILPRENE 1104	PHILPRENE 1600 PHILPRENE 1601 PHILPRENE 1602 PHILPRENE 1605* *Philblack A cold rubber masterbatch	PHILPRENE 1803 *similar to* GR-S 1801 but incorporating 25 parts Philrich 5

PHILPRENE POLYMERS and MASTERBATCHES

. . . tailor-made to fit your rubber needs

We are straining every effort and every reactor to meet the overwhelming demand for Philprene polymers and masterbatches. If we have not yet been able to take care of your needs, we certainly hope to be able to do so at some time in the future.

As you may know, our Sales-Service Laboratory is devoted to finding the answers to questions involving rubber technology. We invite you to discuss your problems with our technical representative. There's no obligation. Call on us at any time.

Phillips 66

PHILLIPS CHEMICAL COMPANY

Rubber Chemicals Division
318 Water Street, Akron 8, Ohio

THIS HANDY BRICK DOES THE TRICK

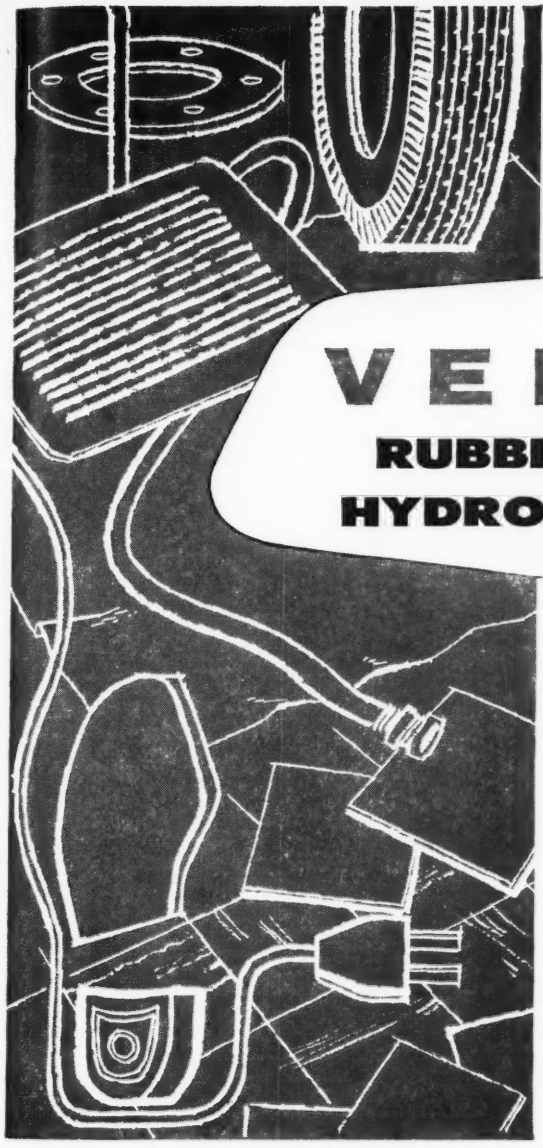
Weighing only 2½ pounds, a brick of Hercules® Defoamer 4 can make up to 40 gallons of highly effective foam control solution. It can be applied at any stages during removal of unreacted butadiene, and in the stripping column for recovery of styrene—wherever foam occurs in GR-S manufacture.

The convenience of the brick form means no waste, no mess, and no heavy drums to handle or ship. We will be glad to send you a sample brick for evaluation under your own production conditions.

Rubber Chemicals Division
PMC Department
HERCULES POWDER COMPANY
914 Market St., Wilmington 99, Del.

HEADQUARTERS FOR HYDROPEROXIDES AND EMULSIFIERS FOR POLYMERIZATION

PM55-1



For Rubber Compounding...

VELSICOL

RUBBER PROCESSING HYDROCARBON RESINS

Available in Varied Melting Point Ranges

- Compatible with natural and synthetic rubbers.
- Effective plasticizers and softeners.
- Improve milling, calendering and tubing characteristics.
- Provide excellent physical properties.
- Ideal dispersing agents for fillers and pigments.
- Possess high electrical resistance properties.

Some Suggested Applications

MECHANICAL GOODS
RUBBER SOLES AND HEELS
RUBBER FLOOR TILING
TUBULAR COMPOUNDS
MOLDED RUBBER PRODUCTS
ELECTRICAL INSULATION COMPOUNDS
RUBBER ADHESIVES AND CEMENTS
RECLAIMED RUBBER SHEETING
GASKETS AND JAR RINGS
COLORED RUBBER STOCKS
HARD RUBBER COMPOUNDS
BATTERY CASES

Write, wire, or phone for complete information on Resins and reclaim oils

RUBBER RECLAIM OILS

Investigate these effective, economical reclaim oils to obtain high-quality reclaim rubber. Velsicol reclaim oils are suitable for a wide variety of reclaiming processes.

VELSICOL CHEMICAL CORPORATION | **VELSICOL**

Division of Arvey Corporation

General Offices and Laboratories 330 East Grand Avenue Chicago 11, Illinois

SERVING THE HEART OF THE

WITCO-CONTINENTAL

announces the opening of a new sales office and technical service laboratory at

213 West Bowery Street

AKRON, OHIO

Modern and complete technical service facilities, together with our Akron and Cleveland sales offices, have been established at this new address. In this location, Witco-Continental aims to attain new "highs" in the promptness and efficiency of our technical service for the rubber industry.

For Witco-Continental service in the Akron area, call POrtage 2-8881. In Cleveland continue to call CHerry 1-0583. Elsewhere, contact your nearest Witco sales office.

WITCO CHEMICAL COMPANY
CONTINENTAL CARBON COMPANY

122 East 42nd Street, New York 17, N. Y.

WITCO

35 Years of Growth

Chicago • Boston • Akron-Cleveland • Atlanta • Houston • Amarillo
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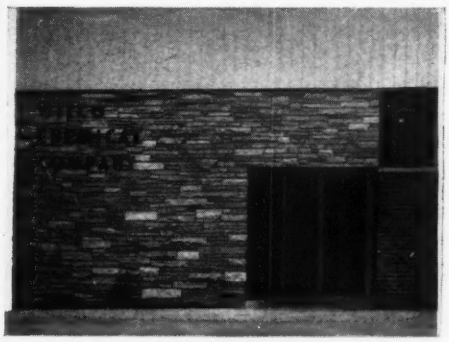
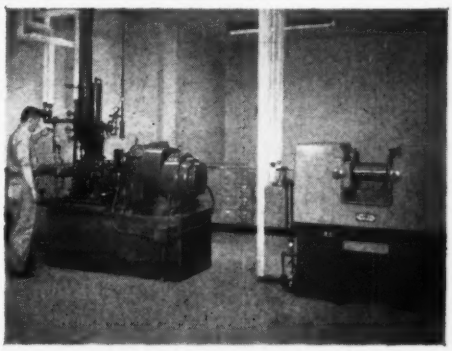
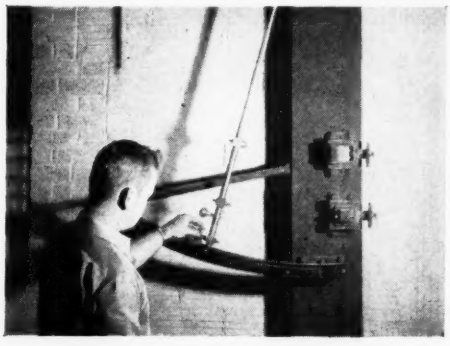
THE RUBBER INDUSTRY



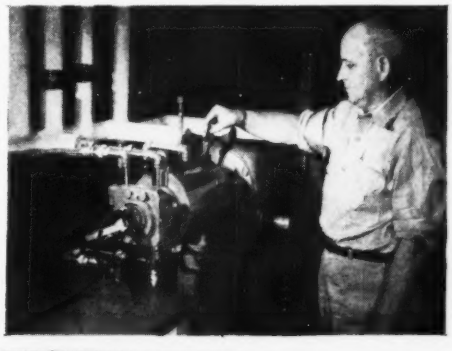
Entrance to Witco-Continental's office and technical service laboratory at Akron, Ohio.



Inside Akron laboratory. Banbury mixer compounds rubber formulations. Rubber mill at right.



Rebound machine tests resiliency of rubber compounds containing Continental Carbon Blacks.



Tuber determines extrusion characteristics and provides samples for subsequent testing.

FOR MAXIMUM SUN-CHECKING PROTECTION

Specify Original Formula

"ANTISUN"*

by

CARY

*Registered Trade Mark

Maximum protection against sun-checking over extended periods can only be guaranteed when a top-notch sun-checking agent is employed.

Cary "Antisun",

formulated of the finest quality ingredients and proven so satisfactory in tire compounding, mechanical goods, insulated wire and cable compounds, is still the same basic formula developed by our President years ago.

- Recommended usage: 2-4% of the weight of the rubber hydrocarbon, depending on the degree of protection desired.
- Unlimited Availability.
- Low Cost.
- Available in convenient chipped or slabbed forms.

Accept no substitute for this time-tested, highest quality product — CARY "ANTISUN".

Cary Chemicals Inc.

Executive Sales Offices: 64 HAMILTON STREET, PATERSON 1, NEW JERSEY
Laboratory & Plant: RYDERS LANE, MILLTOWN, NEW JERSEY

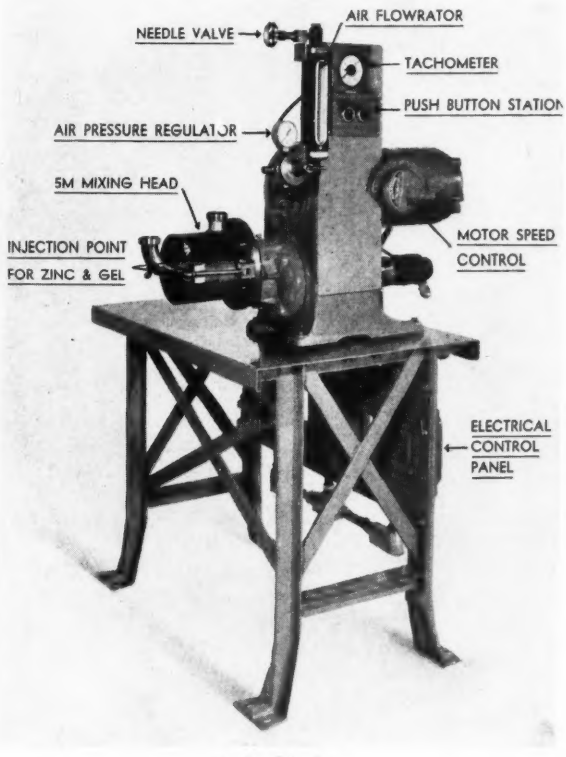
CARY CHEMICALS PRODUCTS:

- Vinyl Plasticizers
- Vinyl Compounds
- Sun Checking Waxes
- Gilsonite Compounds
- Reclaiming Oils
- High Melting Point Synthetic Waxes
- Tall Oil Esters

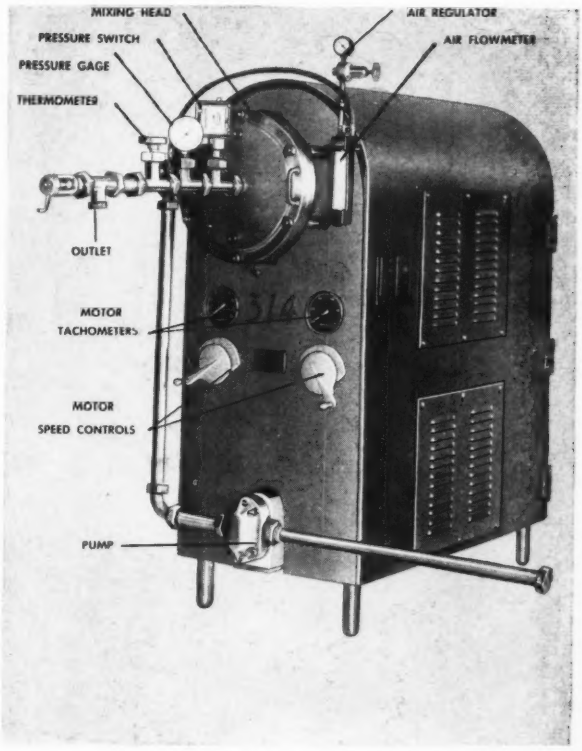
Canadian Representative: Lewis Specialties, Ltd., 1179 Decarie Blvd., Montreal 9, Que.

FOAM RUBBER, FASTER, FINER, WITH OAKES' MIXER-BLENDER TEAM!

Probably you have an Oakes Continuous Automatic Mixer for your foam rubber production. If you do you know all about the performance that has led to the installation of Oakes Mixers in leading plants throughout the world. This exceptional performance—up to 1800 pounds of wet latex per hour—has now been further stepped up by the Oakes Blender. With the blender added, practically no stoppage at all is required for cleaning; uninterrupted operation, hour after hour is made easy, with production of foam rubber of superlative quality.



Oakes Blender



Oakes Continuous Automatic Mixer

Zinc and gel, instead of being introduced in the foaming head of the mixer, are injected in the blender head; hence there is no chance of coagulation in the foaming head, and no need of stoppage for cleaning. The blender head can be opened in a matter of seconds simply by loosening two thumb screws; cleaning requires only the squirt of a hose.

The Oakes Mixer-Blender combination will give you fast, clean production of foam rubber of unmatched quality, uniform, and of satin smoothness, with savings in raw material and labor that are impressive.

THE E. T. OAKES CORPORATION

Commack Road, Islip, L. I., New York

Export Representative: VANDERBILT EXPORT CORP., 230 Park Avenue, New York, N.Y.

Rubber Epicure?

—here's a recipe that will delight you!

SLAB SOLE COMPOUND

	Parts by Weight
GR-S, 1006	90
High Styrene Resin	10
NEVILLE LX-685, 135	12
Antioxidant	1
Calcium Silicate	50
Hard Clay	200
Zinc Oxide	5
Process Oil	5
Mold Lubricant	2.5
Stearic Acid	1.5
Benzothiazyl Disulfide	1.5
Zinc Dimethyl Dithiocarbamate	0.5
Rubbermakers Sulfur	4
Total	**383.0**

For extremely high hardness, approximately 5 parts of phenolic resin may be added.

Cure: 6 minutes at 310°F.
Specific Gravity: 1.66
Hardness, Shore A: 96
Color: Light Brown
Mold Release: Good
Hot Tear Resistance: Good
Cost per pound (estimated): $.092

To Satisfy Your Epicurian Taste for

EASE OF PROCESSING
HIGH HARDNESS
ABRASION RESISTANCE

at low cost specify
NEVILLE LX-685,135

NEVILLE CHEMICAL CO.
PITTSBURGH 25, PA.
Plants at Neville Island, Pa., and Anaheim, Cal.

R-56

NEVILLE

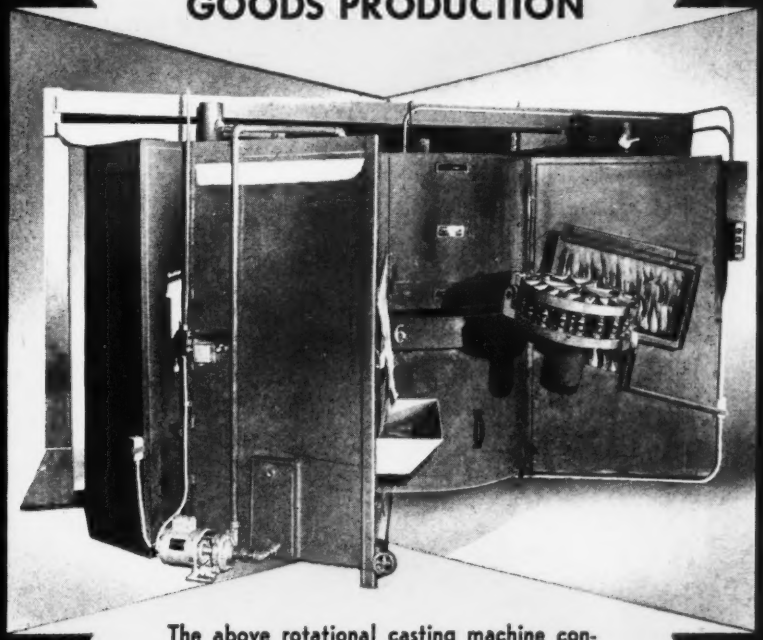
RLD

MOLD MORE PROFITS AUTOMATICALLY!

ROTATIONAL PLASTISOL CASTING

Profits go up when you install our fully automatic rotational casting machine for making hollow plastisol articles. It is a high speed production unit, operated by one person who handles only the raw material and the finished product.

HERE IS THE MACHINE WHICH IS REVOLUTIONIZING HOLLOW GOODS PRODUCTION



The above rotational casting machine consists of a turret base on which are assembled six radial arms, each carrying multiple cavity molds equivalent to a 25 inch diameter molding area. The machine is adjustable from a cycle of 3 to 5 revolutions per hour and the individual spindles rotate at separately controlled speeds. The cycle of production carries the multiple cavity molds through the electric oven for progressive gelling, thermosetting and through cooling chamber, emerging with finished, resilient products. The machine is very compact and can produce as many as 1620 articles per hour. Tell us what you wish to manufacture and we will tell you how to make it faster, with more profit.

NEW PRODUCTS?

New products keep life flowing in any business and our rotational plastisol casting machine offers new opportunities. If you have a new product idea, call on our development department for assistance.

THE KRON RESFORM MOLD CO.

Phone: WAlbridge 8-2015

CUYAHOGA FALLS, OHIO

FORMS	MOLDS	DIES	MACHINERY
LATEX DIPPING	STEEL AND ALUMINUM	PLASTIC-INJECTION	SPECIAL-AUTOMATIC

From friction tape to conveyor belts...

FABRICS FOR EVERY PURPOSE

Imagine a vast array of fabric sample "swatches" spread over the product out-put and processing materials of the rubber industry and you have a practical idea of the range of fabric constructions available from Wellington Sears.

You'd have to include sturdy cotton and high tenacity rayon belt and hose ducks . . . sheetings . . . chafers . . . filament nylon . . . Army ducks spun rayon and nylon fabrics. These and many other cotton, synthetic and combination fabrics in a variety of weights and widths —all would be represented.

Of course, what you won't see is the variety of fabrics not yet in existence—those we will develop for specific rubber-and-fabric problems of our customers. If you have such a problem, why not let Wellington Sears help you find the answer?

Write us for illustrated booklet "Modern Textiles for Industry."

Wellington Sears

A Subsidiary of West Point Manufacturing Company

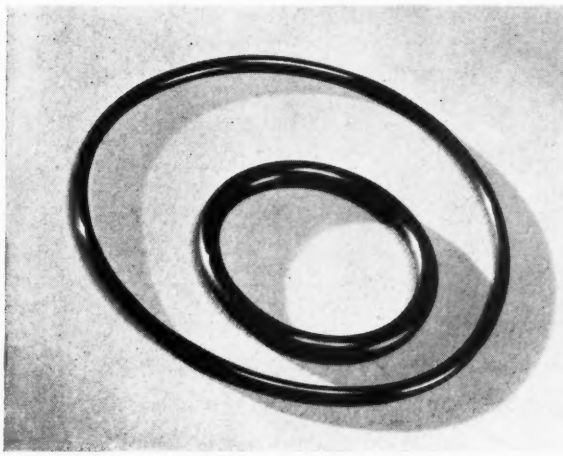
FIRST In Fabrics For Industry

For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products

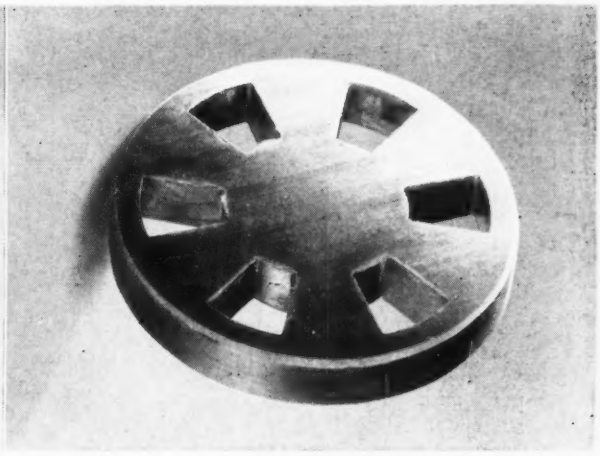
Wellington Sears Co., 65 Worth St., New York 13, N. Y. • Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles • Philadelphia • San Francisco • St. Louis

DUREZ

RESINS FOR BETTER PERFORMANCE

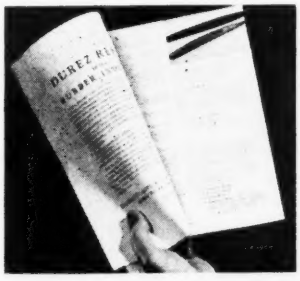


. . . with Buna-N



. . . with Neoprene

International Packings Corporation watches the quality of its packings, oil seals, and other specialties like a hawk, overlooking no opportunity to improve their performance in service. Here are two examples illustrating the benefits of compounding hard and semi-hard stocks with Durez phenolic resins.



Speaking of the Buna-N "O" rings, the manufacturer says, "Durez-reinforced Buna-N is advantageous over carbon black loading in the higher durometer ranges because of better processing and superior physical properties in the cured state." The larger ring is of 97 Shore A hardness, while the smaller ring is a 95 durometer for static application where pressures in excess of 2,000 p.s.i. are encountered.

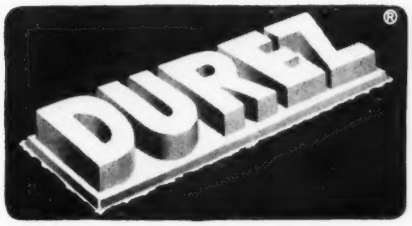
The 3-1/2" x 1-1/2" coupling disk is made of Neoprene-and-Durez to obtain the excellent impact resistance, transverse strength, and hardness required in power transmission service. It does the job, it is said, better than canvas-and-rubber or hard ebonite — and at a lower cost.

If you are not already familiar with the latest developments in resins and their use in compounded stocks, solvent-type adhesives, and latices, our experience is yours to call on at any time. Why not write us today?

YOURS FOR THE ASKING — we'll gladly furnish technical data and help you select the phenolic resin best suited to your needs. As a starter, let us send you our newest bulletin on Phenolic Resins in Rubber.

DUREZ PLASTICS DIVISION
HOOKER ELECTROCHEMICAL COMPANY
209 Walck Road, North Tonawanda, N. Y.

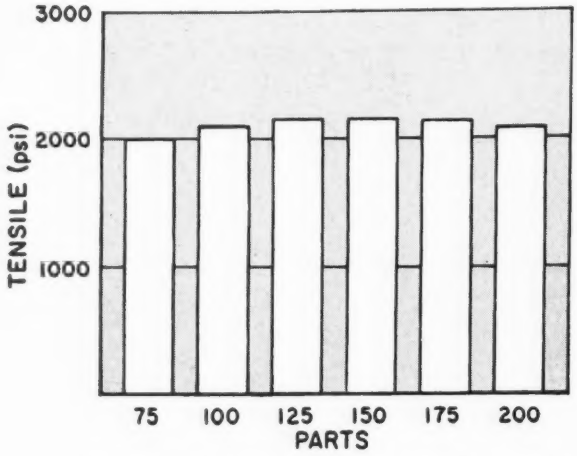
Phenolic Resins for rubber molding stocks, solvent-type adhesives, synthetic rubber latices

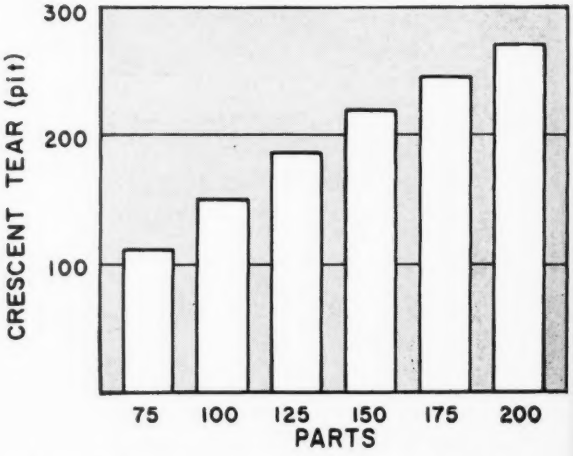


See how you can give GR-S

high tear resistance / tensile strength

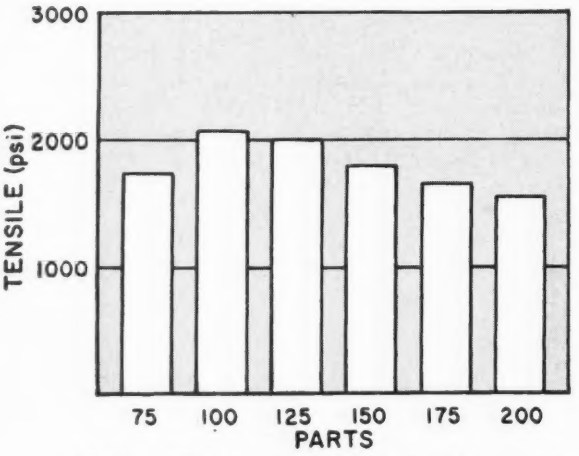
with Super Multifex®

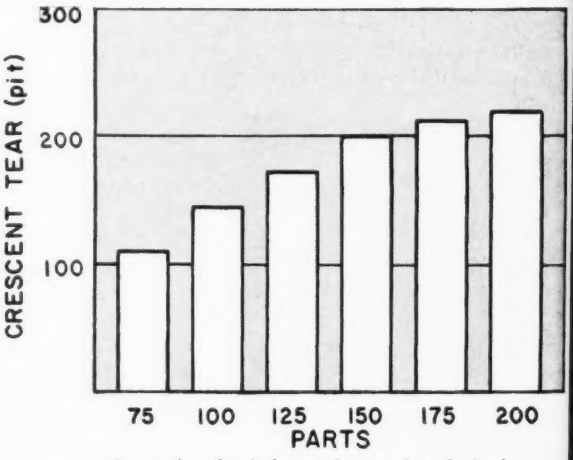




Use Diamond Super Multifex in your GR-S compounds for maximum tear resistance, high tensile strength, and excellent flex life. This precipitated calcium carbonate has extremely uniform, ultra-fine particles (.03-.04 microns), coated to aid dispersion, mixing and processing. Try it in your next order.

and Multifex® MM





Multifex MM is an uncoated, ultra-fine particle (.05–.06 microns) precipitated calcium carbonate. It reinforces GR-S by giving good tear resistance, tensile strength and flex life. Call your Diamond representative today for information and technical help on these and other high-grade calcium carbonates. Or write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

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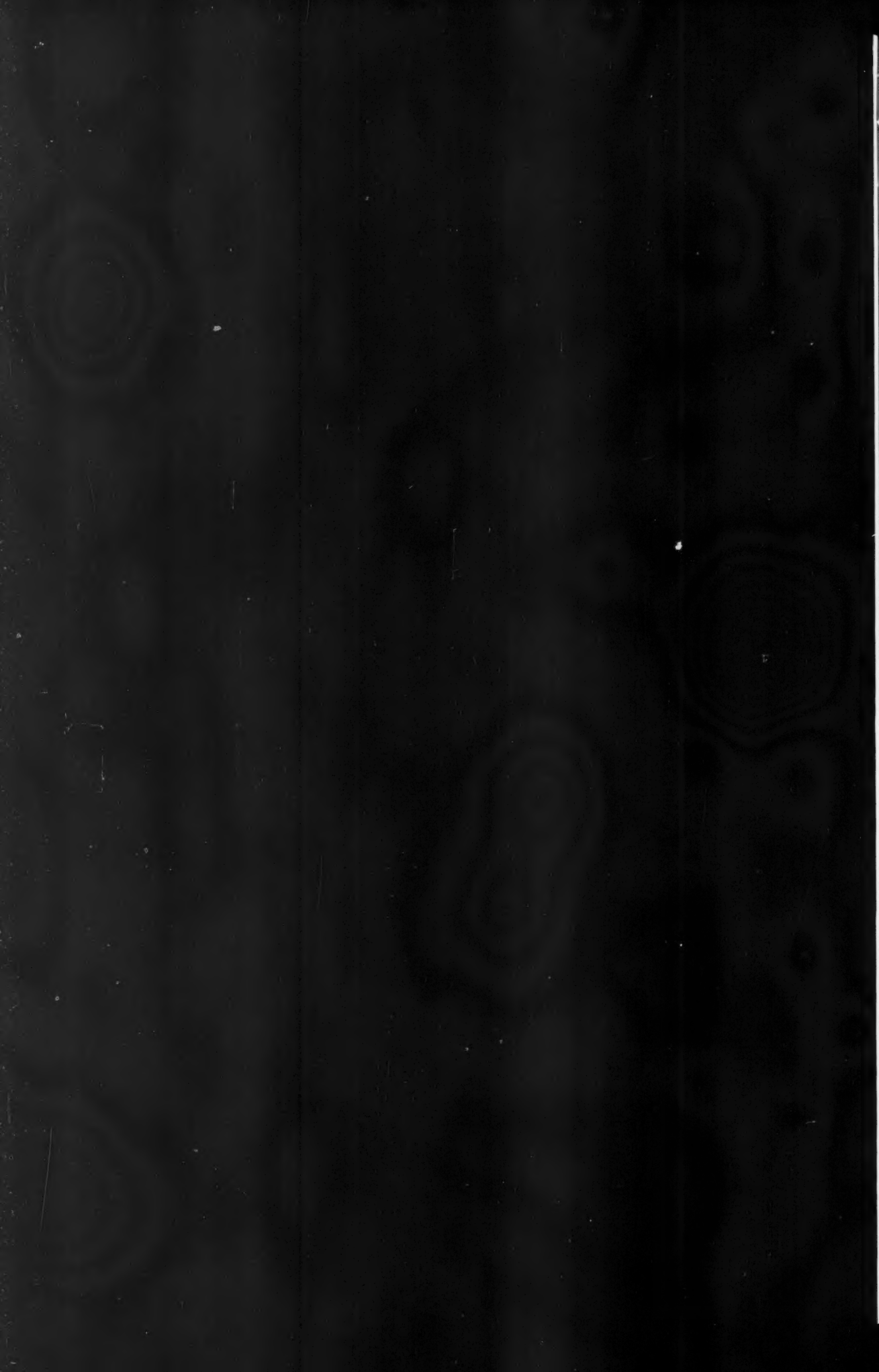

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FB-999

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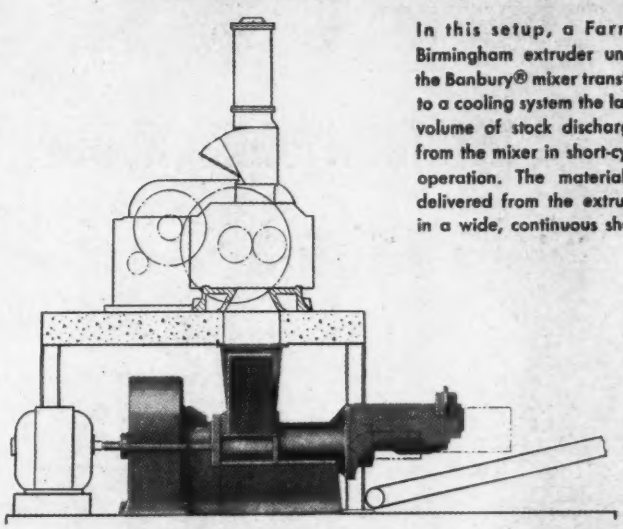
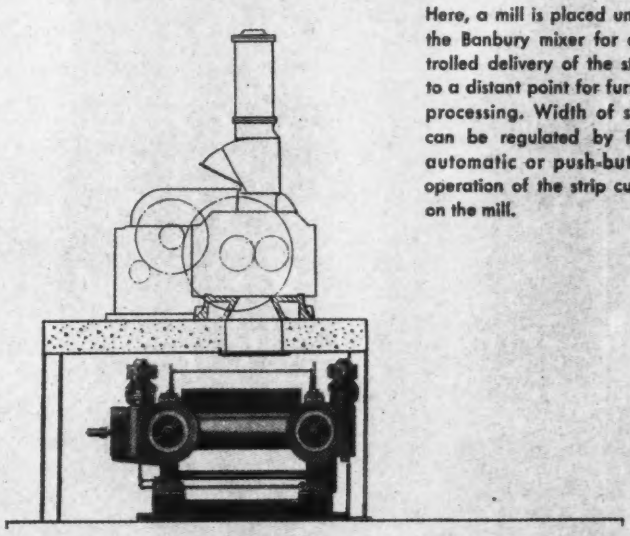


In this setup, a Farrel-Birmingham extruder under the Banbury® mixer transfers to a cooling system the large volume of stock discharged from the mixer in short-cycle operation. The material is delivered from the extruder in a wide, continuous sheet.



Here, a mill is placed under the Banbury mixer for controlled delivery of the stock to a distant point for further processing. Width of strip can be regulated by fully automatic or push-button operation of the strip cutter on the mill.

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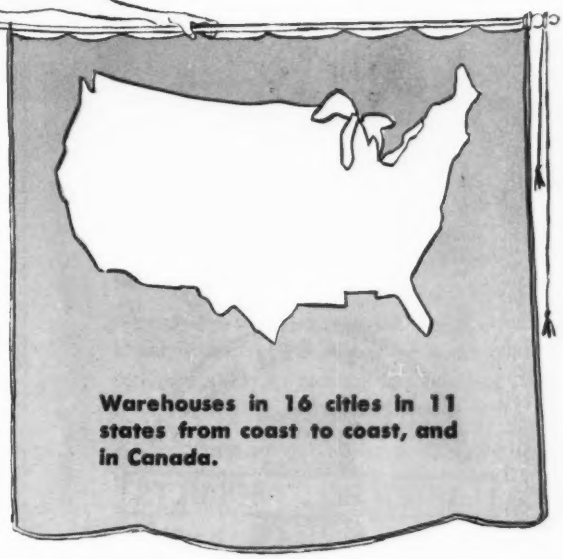

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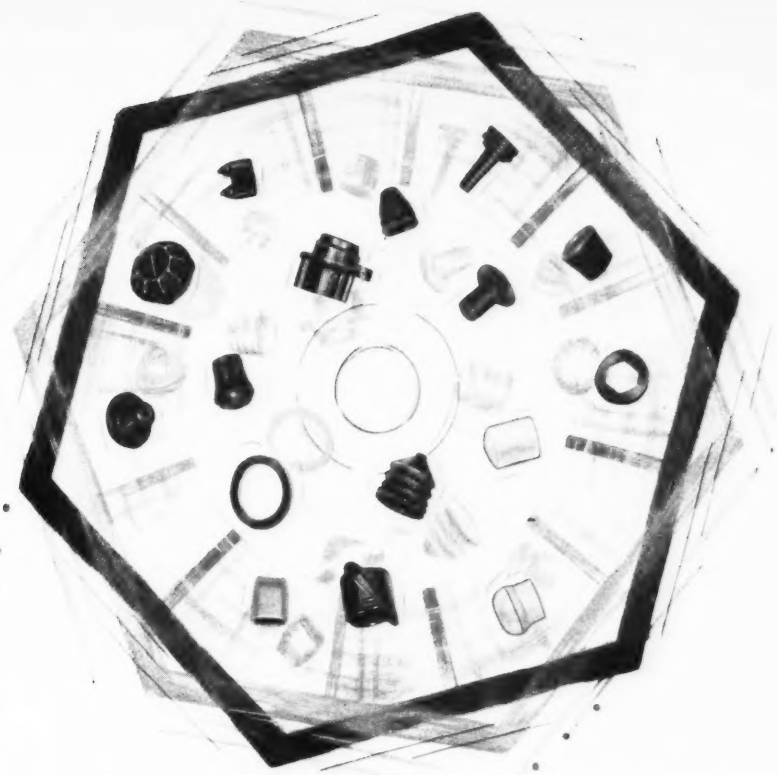

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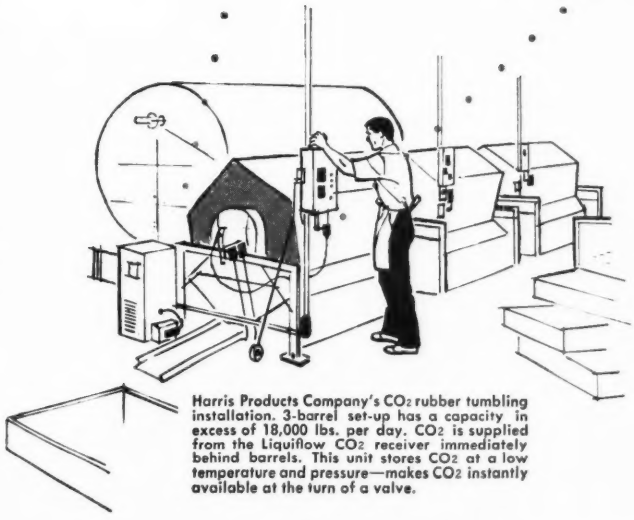

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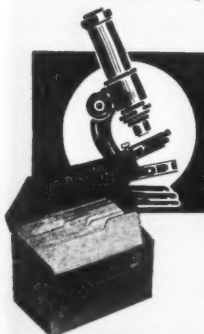

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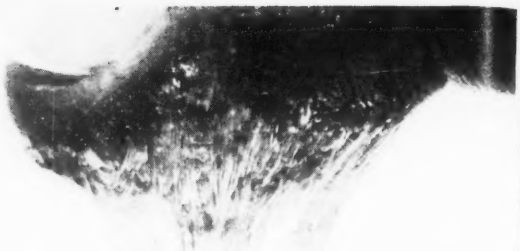

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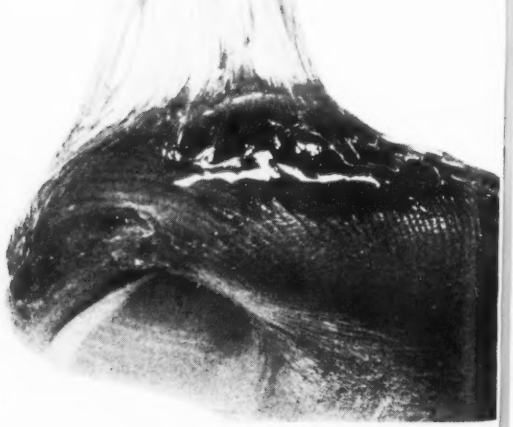

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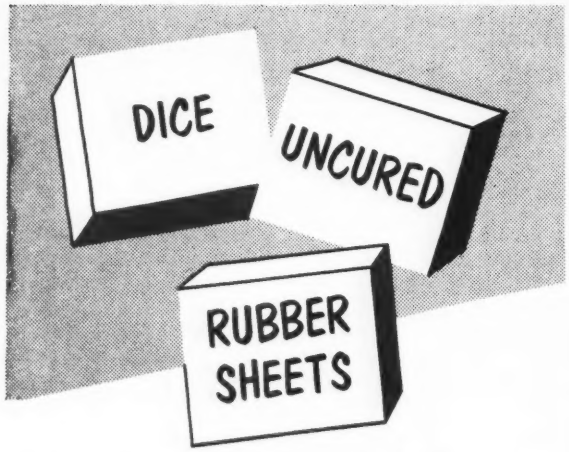

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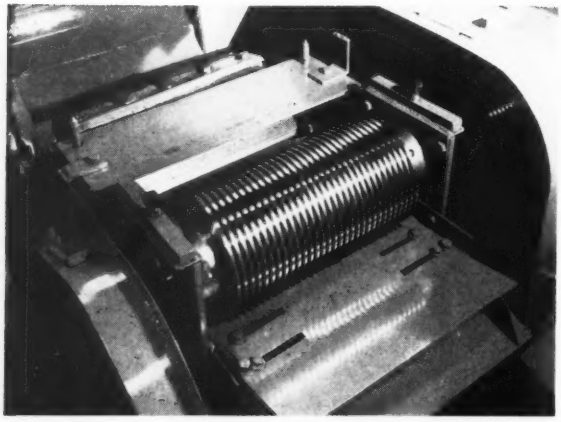

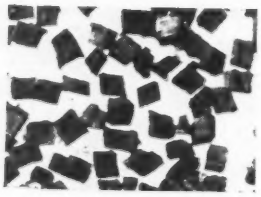

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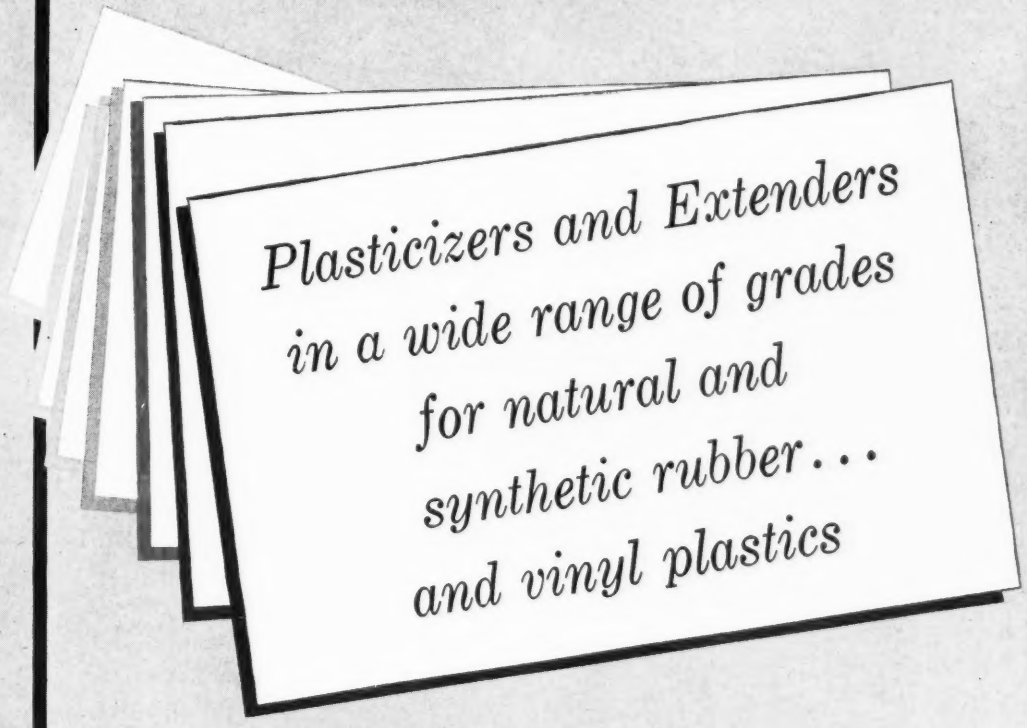

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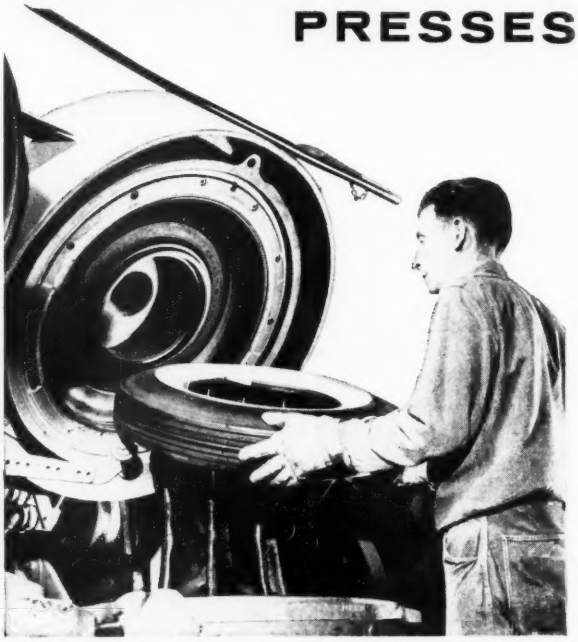

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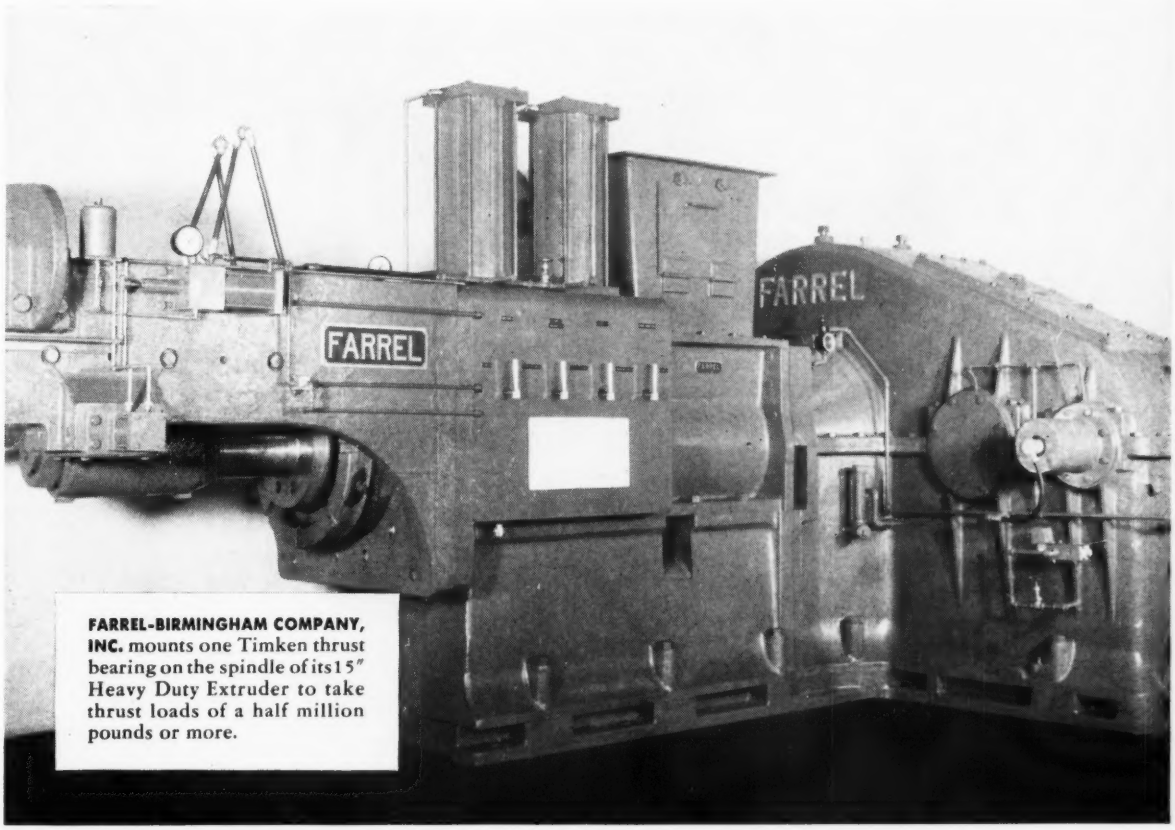

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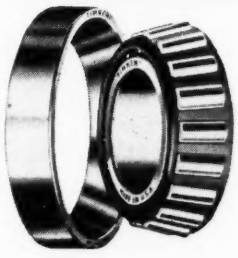

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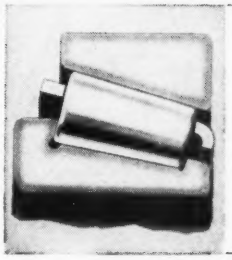

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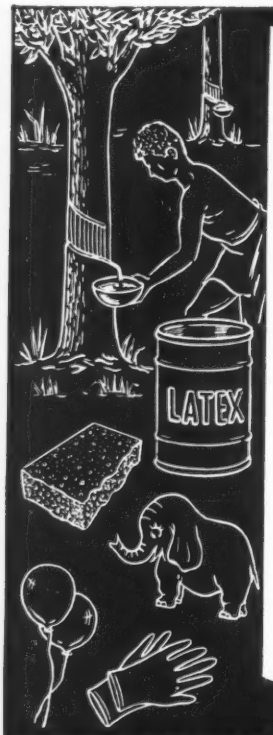

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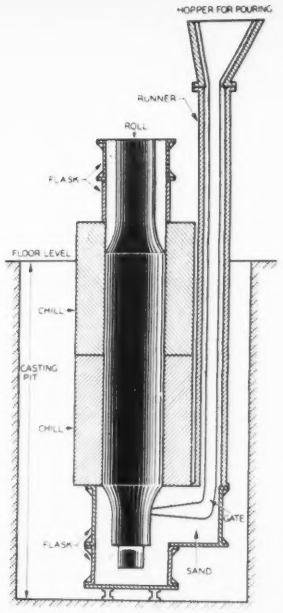

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published monthly by
BILL BROTHERS PUBLISHING CORPORATION

editorial and executives offices
386 Fourth Avenue, New York 16, N. Y.
LExington 2-1760

Chicago office
333 North Michigan Avenue
State 2-1266

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SUBSCRIPTION PRICES
United States, $5.00 per year; Canada, $6.00; all other countries, $7.00. Single copies in the U. S., 50¢; elsewhere, 60¢.

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VOLUME 132 • NUMBER 6 • SEPTEMBER, 1955

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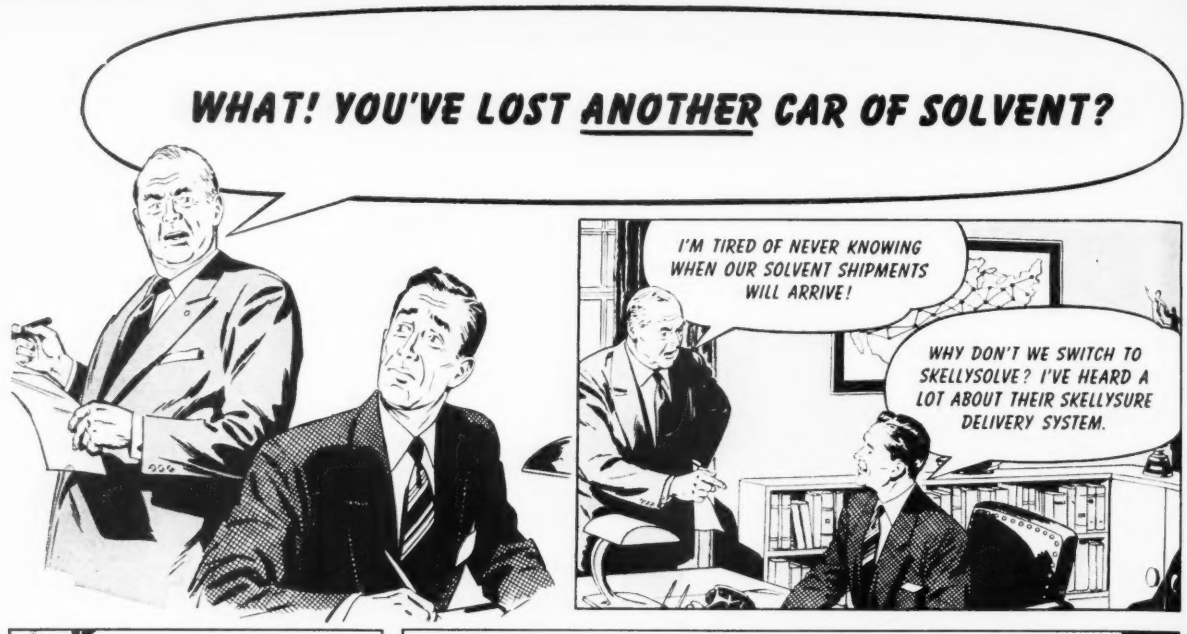
Cover photograph, courtesy of B. F. Goodrich Chemical Co.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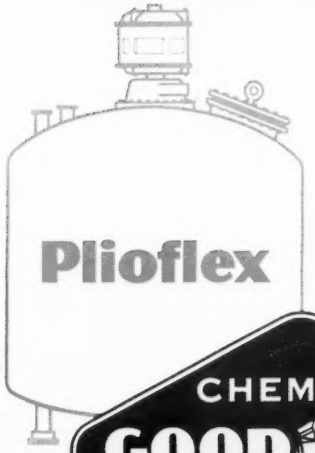

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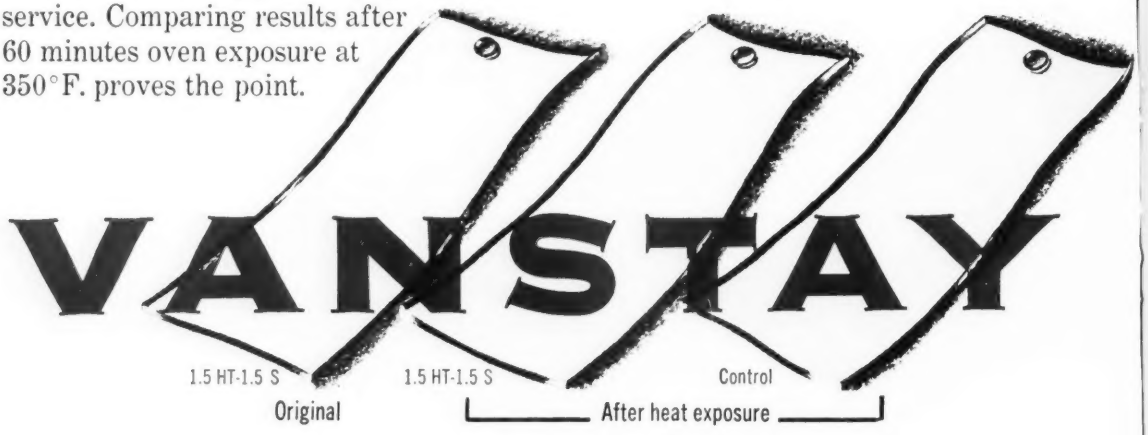

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RUBBER WORLD

SEPTEMBER, 1955

Industrial Research and Development Techniques[1]

By B. M. G. ZWICKER

B. F. Goodrich Chemical Co., Cleveland, O.

The stability of our present economy and the continued growth of our material standard of living are based on change. Industrial research and development have the task of guiding this change so that it will provide products of better value for less money, and they therefore have become an essential cost of competitive business enterprise.

A stepwise technical research and development program is suggested so that economical and reproducible manufacturing processes can be assured. Programs should be planned to provide frequent checks on progress toward the ultimate goal, and premature commercialization must be avoided, if costly errors are to be prevented.

DURING the past 100 years rubber has played an important role in the industrial revolution. The history of the rubber industry therefore offers an interesting study in the evolution of industrial research and development, and the people of the American continents have contributed uniquely to this history.

Rubber—Historical Background

South and Central American natives had found that the sap of *Hevea brasiliensis* and *Castilloa* trees could be used to improve their physical and mental well-being long before Columbus recorded their use of bouncing balls in his trips to the West Indies. Subsequently European explorers reported Indian footwear, capes, and other articles made of this flexible and waterproof material. It wasn't until 1736, however, when de la Condamine (1)[2] reported his Peruvian explorations, that there was written record of the caoutchouc manufacturing technology employed by these American pioneers of the rubber industry.

It was nearly 300 years after caoutchouc and latex were first reported to Europe that the first commercial application was patented by Peal (2) in 1791—latex impregnation of fabric. However this was not the first use invented by Europeans.

Samuel Johnson and Joseph Priestley have both been credited with suggesting the name of "rubber," based on the observation that a piece of it rubbed out writing. In any event, Priestley's name of India rubber was well established by 1820-1825, when C. MacIntosh and T. Hancock patented many uses for rubber solutions and latex as waterproofing materials for fabric, rope, and felt. Tackiness and deterioration problems in commercial applications stimulated these early experimentalists to start the art of compounding, culminating in Lüdersdorf's and Hayward's simultaneous use of sulfur in 1832 for cements and Charles Goodyear's heat vulcanization with sulfur in 1839. [Hancock (3) independently discovered this technique in England about the same time.]

The imagination of these early rubber researchers is

[1] Presented before Rubber Chemistry Division, Chemical Institute of Canada, Niagara Falls, Ont., May 20, 1955.

[2] Numbers in parenthesis refer to bibliography items at end of this article.

remarkable. They visualized many of today's uses for rubber in waterproofing, gas containers, tubing, and electrical insulation. The latter use was quite important since Volta's battery (1800) had opened many uses for electricity, including Morse's telegraph (1832).

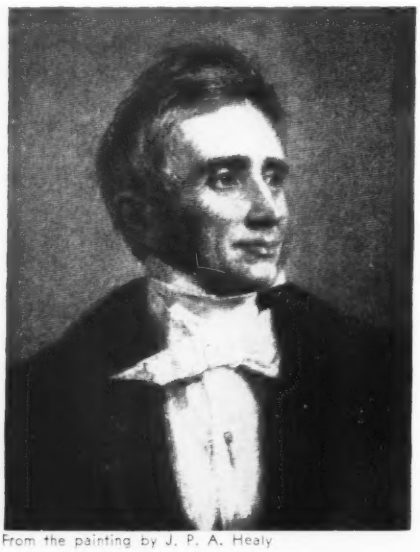
The invention, however, that started rubber toward its present essential position in transportation was that of the bicycle in 1842. Within three years the double pneumatic tire and tube were patented. That same year, 1845, recorded the invention of the turret lathe. Four years later, the year gold was discovered in California, the hydraulic turbine was discovered, and mechanization of industry started.

Development of Rubber Compounding

During the next 25 years inventions came rapidly in both Europe and the New World in power, industrial machinery, and transportation. The dynamo was developed (1860) to make continuous power transmission possible. Steel was discovered (1856-1861) to make faster powered transportation practical.

The new art of rubber compounding also progressed rapidly. The use of inorganic fillers, including zinc oxide, and softeners to extend the scarce supply of wild South American rubber was recorded; hard rubber was devised, and rubber processing equipment developed.

The last quarter of the Nineteenth Century saw commercial development of power, transportation, mechanization, metallurgical, and rubber applications catch up with technological development of rubber. With the development of the horseless carriage rubber manufacturers needed help. Some, such as the founder of our company, saw possibilities in the techniques of systematic research being developed by those fundamental scientists who had been busy with such "impractical and philosophical" matters as filling in the periodic table of elements, proving the electrochemical nature of matter, developing classical organic chemistry, proving the laws of genetics, and demonstrating the mysteries of crystallography.



From the painting by J. P. A. Healy

Fig. 1. Charles Goodyear—His discovery of sulfur vulcanization 116 years ago is still the basis for most rubber compounding

Fig. 2. George Oenslager — Goodyear Medalist of the Rubber Division, ACS, and one of the early industrial rubber research chemists

Organic chemists were hired to explore the black art of rubber compounding; the compounders were given the job of developing laboratory test methods; plant physiologists set about developing better producing rubber trees from those few seeds smuggled out of Brazil by Sir Henry Wickham; and mechanical engineers designed continuous production methods.

Thus 1890-1900, 50 years after the discovery of vulcanization, marks the real beginning of organized industrial research in rubber chemistry and technology. A few really optimistic companies even spent money on research toward a synthetic rubber, based on early discoveries by such workers as Faraday (4) who identified the chemical nature of natural rubber in 1826, Williams (5) who distilled isoprene from it in 1850, and several subsequent observers of isoprene polymerization.

However commercial competition for the rapidly expanding rubber markets, and the rugged individualism of that industrial era kept progress hidden as a "secret art," revealed only by the rapid increase in useful tire mileage and more durable rubber sundries. We now know that fundamental discoveries were made during the early Twentieth Century of organic accelerators by Oenslager in 1906, carbon black reinforcing pigments by Tew and Oenslager in 1912, rubber antioxidants and many other vulcanization and stabilization methods.

Several laboratory techniques of making butadiene, isoprene, and dimethyl butadiene were developed, and several thousand overshoes were made by Hood Rubber Co. from synthetic polyisoprene prior to World War I, when crude rubber reached $2.90 per pound.

Pre-World War II Research Results

In spite of these developments the demand for new rubber continued to exceed the supply, and the United

States became the leader in this demand. Its consumption rose from 30% of the world total in 1910 to 70% of the total by 1918.

Managements of leading rubber manufacturers had seen the contributions of research, and staffs were expanded. World War I had forced the creation of our own chemical industry, and the petroleum companies had fostered the science of chemical engineering. American universities had started training specialists in research and development techniques.

The German military requirements of World War I had also resulted in the first commercial manufacture of poly dimethyl butadiene synthetic rubber. While Methyl Rubber was not an outstanding success in tires, the use of 2,300 tons (6) demonstrated the technical practicality of a general-purpose synthetic rubber. The rapidly expanding automotive revolution and the rubber shortages, followed by the Stevenson Restriction Scheme on natural rubber supply in the early 1920's provided the financial incentive to increase further the rubber research program both in the Americas and Europe.

During the 15 years from 1920 to 1935 the new products resulting from this industrial rubber research program proved that scientific research would provide the needed technical answers. The rubber industry now had really good accelerators, antioxidants, carbon blacks, zinc oxide, softeners, and test methods. The United States patent system was also being used, and it contributed to this progress by early disclosure of new discoveries. As a result, tire value had trebled in serviceability, and there were more than 35,000 rubber products on the market servicing all phases of our industrial economy. Several varieties of synthetic rubber had been commercially introduced for specialty applications.

But technical answers alone are not enough to insure commercial success. This point is well demonstrated by the history of the synthetic rubber development. Independent groups of commercial researchers had found several ways to make elastomers that were better than the polydienes of World War I. Semon (7) plasticized polyvinyl chloride (Koroseal); Patrick (8) condensed alkyl dichlorides with alkali polysulfides (Thiokol); Carothers and coworkers (9) developed polychloroprene (neoprene) from Nieuwland's basic research (10) on acetylene reactions; alkali metal polymerization of butadiene was developed in both Russia and Germany (SK and Buna) (15); and Konrad and coworkers (11) demonstrated the value of copolymerizing vinyl monomers with butadiene (Buna S and Buna N). Thus by 1935 five basically different types of synthetic elastomers were in pilot-plant production for specialty uses. The economic depression, however, had erased the immediate need of a direct synthetic competitor to *Hevea* rubber which had at last caught up with demand.

Many people outside the totalitarian countries considered the economics of general-purpose synthetic rubber no longer practical. Research, however, was continued by several groups: petroleum and chemical companies found way to make the various monomers more economically; polymer manufacturers developed faster recipes, better polymerization methods, and easier processing rubbers; and a sixth class of synthetic rubber was found by Sparks and Thomas (12) based on cheap isobutylene (Butyl rubber). Even by 1940, however, production of synthetic elastomers outside Russia and Germany was not more than semi-works scale, and world consumption of synthetic was not more than a few per cent of the total. Nevertheless the contribution of this early research to our basic knowledge of rubber and the scientists trained by the work proved to be a real heritage when 90% of the free world's rubber supply was cut off in 1941.

The GR-S Program and Postwar Years

Unquestionably the World War II emergency created a synthetic rubber industry much faster than could ever have been achieved under normal economic conditions. In fact, the development of the butadiene, styrene, and GR-S general-purpose rubber capacity in the United States and Canada from less than 5,000 tons to nearly three quarters of a million long tons per year in less than two years stands as proof that highly competitive American industry is fully capable of remarkable selfless cooperation when its right to remain free is at stake.

Many of the German scientists and industrialists interviewed in 1945 by our T.I.C.C. representatives frankly didn't believe it when they were told that more than 50 million tires were already operating with over 50% GR-S, and that more than 85% of our total new rubber requirements in 1945 would be satisfied by American-made rubbers.

It was indeed a real triumph for the scientists, engineers, equipment manufacturers, construction workers, industrialists, and financiers—the government representatives in this case. It was an especially rewarding triumph for those few industrialists that sold the idea of an American Synthetic Rubber Industry in the first place, long before Pearl Harbor. But it all would have been impossible if it were not for the so-often forgotten rubber compounders and tire builders who had to use the first GR-S that came out of those plants to make serviceable tires and other useful rubber products.

The postwar years have seen the synthetic rubber

Fig. 3. Butadiene and GR-S type rubber plant at Port Neches, Tex.—The largest combined production installation for this type of synthetic rubber in the world and now jointly owned and operated by Goodrich-Gulf Chemicals, Inc., and Texas-U. S. Chemical Co.

Elwood M. Payne, Houston

industry mature to a highly competitive and versatile segment of our economy. There are nearly 500 varieties of at least 12 basic types of synthetic elastomers and their latices commercially available in the U. S. and Canada from more than 30 polymer manufacturers. The recent disposal of the United States Government GR-S and Butyl rubber facilities is sure to intensify further this technical competition.

It has been argued that since the war we have had prosperous times, and therefore no conclusions can be drawn concerning the economic stability of an industry. A comparison of specific industries and companies shows, however, that some have achieved a much larger share of this prosperity than others. In such a complexity of free economics, high government taxes, military preparedness, high birth rate, wage and salary revolution, professional hucksters, and technological advancement, it would be presumptuous to select one outstanding reason for these specific differences in industries. But an interesting speculation can be postulated: has the larger share of the consumer dollar gone to those who have changed their products to provide better quality and value, even at increased initial price, rather than to those who have insisted on gimmicks, price deals, and marginal quality to move status quo goods?

The chemical industry was one of the more successful business operations during the depressed 1930's. It has continued to prosper during the postwar period. Synthetic rubber and plastics fabricators have contributed to and shared in this success. Relative price stability has been a characteristic of this industry, with rising labor and raw material costs being largely offset by increasing volume to fill new applications and expanding markets. Progressive change has become accepted by manufacturers, fabricators, and ultimate consumers alike, and competition at the research and development level has been accepted as an essential business function by polymer manufacturers for the past 15 years.

Problems and Progress in Polymer Research

While progressive fabricators have been using these new synthetic raw materials to replace natural products for many applications, they have also found completely new ways of doing things and have created new consumer products that satisfied hitherto unfilled human desires. But some potentially serious problems must be faced in the increasingly competitive years ahead:

(1) Polymer manufacturers and fabricators may tend to offer inadequately tested or actually unnecessary new and different polymers and products just for appearance of competition and progress.
(2) Product manufacturers may fail to take advantage of really improved polymers through indifference, resentment, technical inability, or too much dependence on the polymer manufacturers to do the whole job.
(3) Consumers may become reactionary or bearish and fail to keep up demand for improved materials.

It will take a cooperative and realistic approach by both manufacturing industries to maintain sound progress toward the essential goal of better consumer value for less money. After all, this is synonymous with the improvement in our standard of living. If the actual or potential existence of these problems is accepted, then the following precepts are submitted as a possible approach to a rational, cooperative program between supplier and fabricator, with ample room for free enterprise and competition to contribute the most toward our basic objective of efficient worthwhile service to our ultimate customers—the people of our nations.

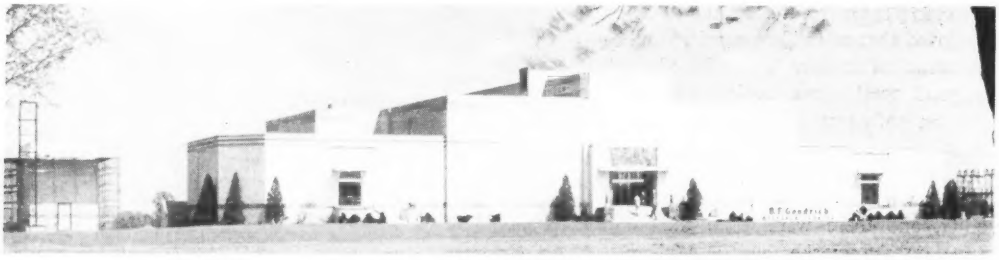


Fig. 4. B. F. Goodrich Research Center—A modern industrial research laboratory where ideas for new products come from fundamental and exploratory research and are evaluated by applied research

(1) Both polymer and product manufacturer should accept research and development as a necessary cost of doing business and so provide each company with the means for sound technical communication and judgment. This premise will have to be sold to the ultimate consumer so that prices can reflect these honest costs.
(2) Competitive enterprises in both industries should exercise restraint and avoid premature, emotional or dishonest commercial promotion of products which could lead to loss of manufacturer or consumer confidence.
    (a) Polymer manufacturers should be sure they have a really improved product, and that they can make it reproducibly at an acceptable price before asking product manufacturers to spend the time to evaluate and develop applications for it.
    (b) Product manufacturers should analyze long-range needs of really improved polymers and thus help polymer manufacturers to aim in the right direction. Meanwhile, they should do their best to make products for existing needs with com-

mercially established polymers rather than depend on some new material.

It takes ideas, time, money, and hard work to develop proper commercial outlets for any new polymer. It also takes the same elements to develop it in the first place. Attempts to rush a logical development program lead to wasted effort, overtime costs, bad judgment, hurt feelings, and sometimes even damage suits. Therefore it is important that we cooperatively agree on a program that will be guided by planning and common sense rather than by haggling and state-of-emergency operations. Acceptance of such a code of ethics, even if the result were assured Utopia, would still require a tremendous and continuing effort to make it work. It at least could lead, however, to a better understanding between those of us who are interested in improving machines and goods by using elastomers as materials of construction.

Goodrich Chemical Approach

At this point a brief description is offered of the approach to research and development planning now in use by the B. F. Goodrich Chemical Co. toward these objectives.

Polymer Development Steps

A theoretical new polymer development has been divided into six phases:

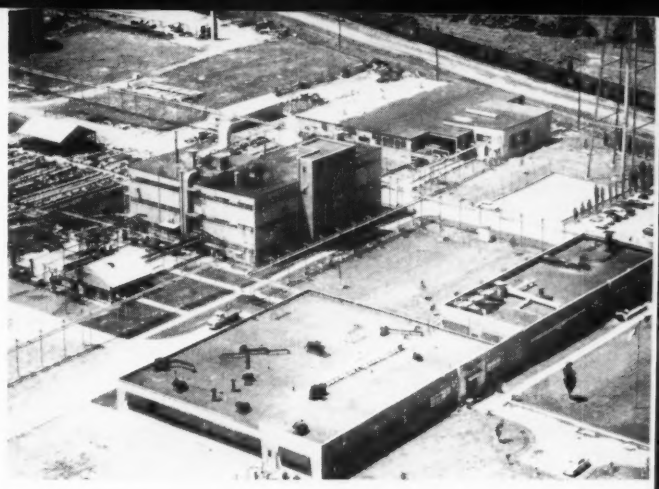
PHASE (1) EXPLORATORY RESEARCH—Selection of the best approach to solution of a defined problem. (This is objective industrial research rather than fundamental subjective studies which The B. F. Goodrich Co. also maintains as a separate basic research function.) This is the cheapest kind of technical work, but often seems the least productive and frustrating—until you find what you are after, or oftentimes something else that is much better.

PHASE (2) APPLIED RESEARCH—Cooperative process research and objective product evaluation to affirm the new product's marketability and attainment of the desired goal. This is the most important phase of all and requires exceptional judgment. Properly done, this is the cheapest kind of insurance, no matter how much it costs or how long it takes. This is the place where many mistakes have been made by depending on clairvoyance or by being too impatient.

PHASE (3) MICRO PLANT—Small-scale process engineering for untested or new processes to select the type of new plant design. Much money can be saved by this step if it is at all applicable to the product.

PHASE (4) PILOT PLANT—Translation of laboratory and micro-plant data into larger-scale process, and preliminary product application development. (Some cooperative customer evaluation may be required at this point for highly specialized polymer applications.) Too often this step is omitted or glossed over. Even if no new equipment is required, the product specifications, market potential, ultimate costs, and assurance of commercializability by the particular company must be reaffirmed.

PHASE (5) SEMI-WORKS—Manufacture of selected specification product for cooperative market development with product manufacturers. The die is now cast —you are committed and must be prepared for whatever the customers decide.



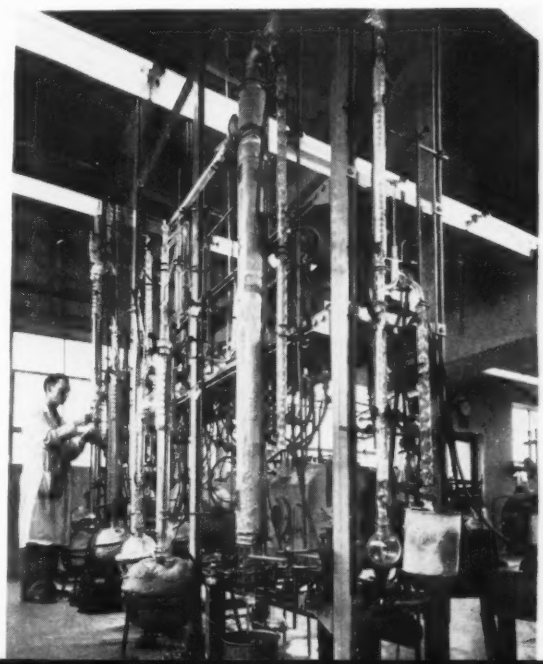
Kucera & Associates

Fig. 5. Aerial view of Avon Lake Experimental Station of B. F. Goodrich Chemical Co., where micro plant and pilot-plant development determine the economics, product specifications, and applications for new products prior to semi-works production and sales development efforts of the company

PHASE (6) PRODUCTION—Normal production and sales to fill the established market and increase applications for the new product. This requires continuing technical service and process improvement.

To support such a program the functions of technical research, market research, process engineering development, product applications development, market development, field testing, and the services of patent attorneys, purchasing agents, toxicologists, and advertisers are all required prior to commercialization and accept-

Fig. 6. Micro plant at Avon Lake Experimental Station of Goodrich Chemical—Fundamental engineering data are obtained from such small set-ups for continuous chemical reactions and help to reduce subsequent pilot-plant expense



ance of a new product by normal production and sales departments.

Program Review

Because the expenditures in both manpower and equipment increase substantially with each phase of such a development, it is important to have a thorough review of the program before undertaking each succeeding phase. This review is designed to cover the following essential points:

(1) TECHNICAL—Status of technical problems requiring solution to achieve the goal of a really improved product and be sure of ability to make it uniformly in a production plant.

(2) ECONOMICS—Estimated manufacturing, investment, and marketing costs at various production levels (including a new plant) together with development needed to make cost as low as practicable, consistent with the technical goals.

(3) RAW MATERIALS—Current and future raw materials costs and availability, with necessary steps defined to develop assured supplies at reasonable costs.

(4) PATENTS—Current and potential position of ourselves and competitors so that adequate recognition can be given to operation of the patent system.

(5) MARKETS—Present and future (at least five years) requirements for products of this type and basic technical needs of the industries involved; includes analysis of price requirements, competitive materials, and ultimate consumer acceptance.

(6) COMMERCIAL—Competitive position of our company and our ability to market effectively; probable future trends in competition and customers; commercial requirements for technical service, advertising, and distribution methods.

(7) PROPOSED PROGRAMS—Dollar and manpower requirements—past, present, and future (at least five years). Estimated time table for completion of the necessary phases, including estimated distribution of effort by the various operating and service groups. This includes a roll-up cost projection sheet for estimated production plant and sales forecasts from which payout of research, development, and engineering costs as well as plant equipment can be estimated.

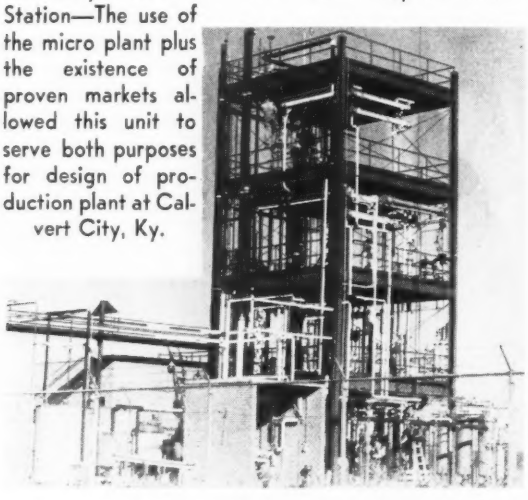


Fig. 7. Combined pilot-plant and semi-works plant for acrylonitrile at Avon Lake Experimental Station—The use of the micro plant plus the existence of proven markets allowed this unit to serve both purposes for design of production plant at Calvert City, Ky.

Fig. 8. Waldo L. Semon—He demonstrated the value of serendipity in research when he used plasticized polyvinyl chloride for something other than the adhesive he was looking for

It is obvious that the amount of information available for analysis will increase substantially, and its accuracy can be considerably improved at each phase of the development. The importance of attempting economic projections, however, even before the beginning of Phase (2) cannot be over-emphasized. This requires something other than normal engineering and accounting groups. We have chosen to use chemical engineers with the assistance of statisticians to perform this cost-estimating function. They keep track of their accuracy by comparison with actual engineering construction jobs and by cross-checking with construction companies and various industries.

Various yard sticks are used in these calculations to determine the merits of proceeding with the development. These include return on capital investment, return on total investment, payout time for the plant, payout time for the research and development, break-even point, and return on sales dollar. Other intangible factors such as anticipated rate of plant deterioration, technical obsolescence, price, taxes, and interest fluctuations must be used to modify the above yard sticks in each particular instance.

It is clear that this type of development requires hard work, time, and money. We believe, however, it pays off in substantial and worthwhile contributions of improved and new products for our customers and therefore in long-run net savings and real progress for all, rather than wasted effort in chasing ghosts.

Case Histories

Theories are of little value unless they can be put into practice. B. F. Goodrich Chemical Co. already has several commercial products that have evolved through

such development programs. Brief case histories are offered for two of them that are sufficiently distinct from our other activities to be acceptable examples.

The first product to be discussed is Geon 121—plastisol vinyl resin—already well established as a major progressive step in plasticized vinyl resin technology.

The second product is Hycar 2202—Butyl rubber containing bromine—newly introduced as a method for making the desirable properties of Butyl rubber more available to the rubber compounder.

Plastisol Resin

W. L. Semon is credited with the discovery of plasticized polyvinyl chloride in the middle 1920's. This is an excellent example of the importance of serendipity in research work. He was actually looking for a better rubber-to-metal adhesive.

While many of the early workers with plasticized polyvinyl chloride visualized the advantages of a liquid casting and heat setting plastisol, the Germans probably were first to make commercial use of it in the late 1930's. In the United States the type of resins first manufactured lent themselves better to organosol (solvent cut) and grinding operations. However, work toward the goal of a low-viscosity paste at about 65 phr plasticizer was continued in B. F. Goodrich research, in spite of monotonous discard of many possible answers that "weren't quite good enough."

Finally it was concluded that the ultimate goal could better be achieved by a direct engineering research approach, despite the recognized high cost of such a project. Pooling all research data available both here and abroad to minimize chances of failure, the project was started. It had to go through a painful, expensive gestation at each level of equipment size, with particle size variations from free floating aerosols to one particle per reactor charge. An added agony to our comptroller

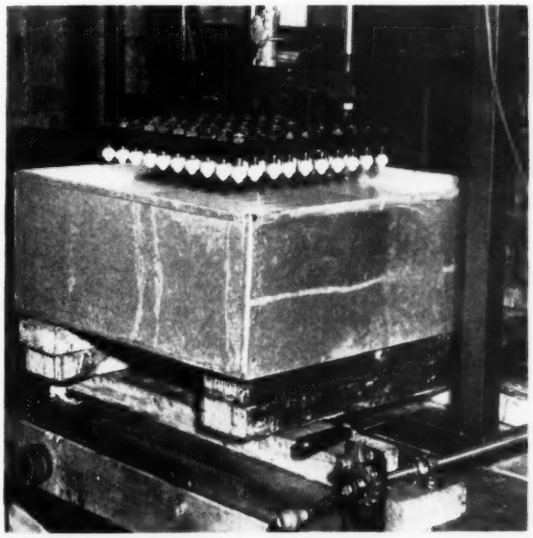


Fig. 9. Geon 121 plastisol dip molding is more economical than compression or injection molding of complicated vinyl plastic parts

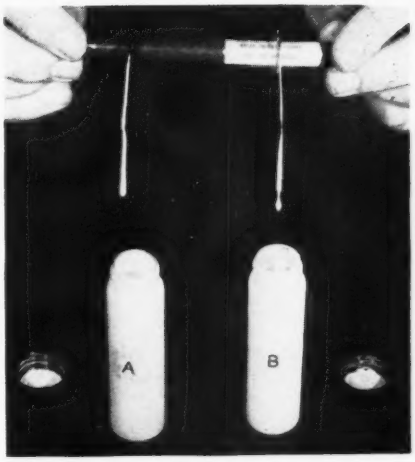


Fig. 10. Compound development of Geon 121 plastisol for customer applications—This illustration shows a non-drip formulation (sample A) developed to prevent sagging during fusion as compared to regular vinyl plastisol formulations

was our increasingly critical technical specification of what our goal was to be—a stir—in PVC resin that would give a free flowing, highly dilatant (what an educational period to get that word at least accepted, if not understood), forever stable plastisol, with 60 to 80 parts of plasticizer to 100 of resin. There are many types of rheology for dispersed systems, and we finally learned enough to be able to make them all consistently and at will.

Meanwhile the product development work that had made the technical problems more difficult confirmed and enlarged the potential applications for a really good plastisol resin. Mixing and compounding techniques were developed for customer use, and exploratory customer sampling was started to check our conclusions as the product quality improved.

Finally semi-works production was started with its product refinement period and compromise on the final product specifications. Our cooperating potential customers had the patience of Job and a willingness to spend much of their own money because they appreciated the advantages of achieving the ultimate goal. Demand for product modifications to suit differing customer needs required further work. But as our collective experience in this new technology grew, compounding tricks, addition of other resins, and continued process development work in our semi-works plant finally brought us to the decision to freeze the product Geon 121 (13).

How long did this program take? Actually too long. We can always see unnecessary delays and errors when we look back on any of our developments. Actually, the exploratory research phase was easily 15 years in this case; micro engineering was by-passed; applied research had to be combined with pilot-plant process development before we started making real progress and required about five years even then; Semi-works, starting in 1947, took at least three years to reach the

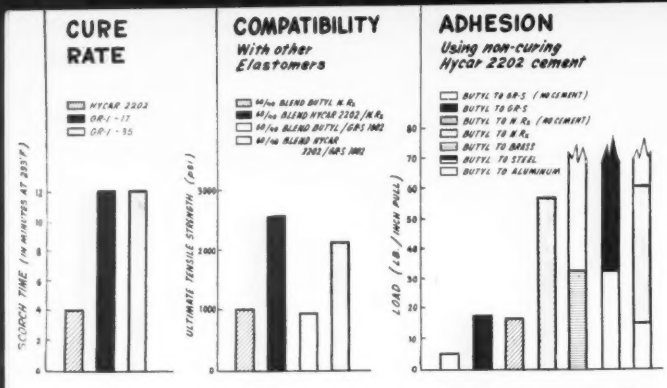


Fig. 11. A new product, Hycar 2202 is a modified Butyl rubber which cures three times as fast as regular Butyl, covulcanizes with other rubbers, and adheres to both rubbers and metals

production stage. Thus the really active research and development required about eight years, which is not abnormal for a major development of this type.

Was it worth it? The rapidly growing commercial importance of PVC plastisol resins tells us that it was. The simplicity of product manufacture and the variety of new products made possible by this technology explain why our original objective was fundamentally sound.

Brominated Butyl Rubber

Butyl rubber has frustrated compounders for years because it has been so independent. The exceptional heat and oxidation resistance would be valuable additions to many rubber products, but Butyl does not blend with, covulcanize with, or stick to other rubbers or metals.

The excellent resistance of Butyl to air diffusion was needed for several laminated rubber products, but adhesion during vulcanization was so poor that the products would separate with flexing. All types of commercial adhesives had been tried without practical success. An objective applied research and exploratory research program was started simultaneously on the problem during World War II. This work resulted in the discovery that brominated Butyl rubber cement would greatly improve strip adhesion of Butyl to GR-S and natural rubber during cure. This might have been accepted as the desired solution to the original problem. However our scientists were alert to the payoff of serendipity; so they dug deeper to find out why. Isolation of the brominated Butyl rubber from the cement and subsequent testing showed that the product was strikingly different from the original Butyl rubber: (a) It cured three to five times as fast. (b) It would blend and covulcanize with GR-S, natural rubber, and other elastomers, including Butyl itself. (c) It would adhere to metals and fabric surfaces as well as to many other elastomers against which it was cured.

Had these deficiencies of Butyl rubber not been in the minds of the research workers, they would not have devised the experiments to test this new material. However the really important property of the brominated Butyl was that, when properly made, its vulcanizates retained the desirable qualities of the original Butyl rubber.

All of these facts were established nearly ten years ago. Yet our Hycar 2202 wasn't announced until last fall (1954). This intervening time was essential for development of the best practical product, an economical manufacturing process, and sufficient technical information on its compounding and use to warrant commercial introduction.

At first the research department made enough material by brute force so that application tests could be tried in several possible products. Some of these were disappointing. Compounds scorched; laminates wouldn't stick, and some field tests showed deficiencies not predictable from the laboratory results. For several years the applied research department worked on the problems until a product was developed that would impart the desired properties to finished products under simulated product manufacturing operations.

At this point pilot-plant work was undertaken. The original process would never allow sale at less than $1.25 per pound, even in large volume. At that price the product could only be used for highly specialized applications, and these markets weren't enough even to achieve the $1.25 price.

Here was another chicken and egg problem, which could only be solved by finding a basically cheaper way to do it. Several processes were considered, and the best one was finally selected on the basis of compromise between lowest cost and best product quality. This was done by cooperative pilot-plant process development and applied research product development. By the time the product and process specifications were established, everyone from research to sales had been in on the act.

Finally, when there was enough technical information available and sufficient approved product on hand from semi-works equipment to satisfy potential customer inquiries, the formal announcement was made in technical reports (14). By this time we had convinced ourselves that here was a worthwhile new product to make available as a raw material to the tire, mechanical rubber goods, footwear, and wire and cable manufacturers.

As a responsible raw material manufacturer, we must now be prepared to back up this judgment with technical service to our customers. Also development work must continue to reduce manufacturing costs further so that if a large enough demand develops, the most economical production facility can be built. Our confidence in this new product was derived from this logical selective type of research and development program. It is our hope that our progressive customers will start serious development programs with our help toward new and better end-products because they have confidence in our judgment.

Summary and Conclusions

In presenting the procedures, it should not be inferred that this pattern is unique to B. F. Goodrich Chemical Co. Many excellent products in use today weren't known commercially ten, or even five years ago, which were created by similar research and development programs in the chemical industry. They have been successful because the product manufacturer did his part by taking full advantage of the opportunities they offered.

This discussion should only be considered a progress

(*Continued on page 757*)

Elastomeric Cellular Materials—II[1]

By T. H. ROGERS

The Goodyear Tire & Rubber Co., Akron, O.

THE polymerization methods for making vinyl chloride polymers go through the latex stage in the same manner as those used for making synthetic rubber. Vinyl latices may also be stabilized and concentrated to high solids. However, when the vinyl latex is foamed, and the gelation agents are added and followed by the accompanying decrease in pH, the particles are found to have very poor cohesion. After gelation, instead of a film being formed around the bubbles, the particles form a series of broken films which produce a weak "cheesy" foam structure. Consequently very little success has been achieved from the use of this method for making vinyl foam.

Vinyl Foam

So-called vinyl foams are compounded polyvinyl chloride compositions resembling latex foam rubber in that they have interconnected cellular structure. The cellular structure is formed by a gas (generally nitrogen or carbon dioxide) bubbling out through a plastisol formulation. The gas can be generated in the mix by the decomposition of a chemical blowing agent or through a "charging" procedure. The blowing agent method, however, is more generally used.

This method of producing vinyl foam entails the mixing of a blowing agent into a plastisol. The plastisol is then poured into a mold which is either open at the top or has a cover that has vent holes in it. These vent holes allow the displaced air to escape as well as to allow surplus stock to overflow. Depending on the density of the stock desired (which is regulated by the amount of blowing agent), the mold is filled between ⅛ and ½ its volume with plastisol. Heat is applied to the mold, through the use of a hot plate, a hot air oven, or by radio-frequency induction heating. As the blowing agent decomposes, the piece expands to fill the mold, and as heating is continued, the plastic mass gels. The piece is removed after cooling and is then suitable for use.

As compared to closed cell foam, this vinyl foam sponge requires no after-heating as it is the size desired when removed from the mold. Also, as compared to latex foam rubber, vinyl foam does not shrink during the curing process since no curing process is necessary. These factors makes possible the foaming of parts to an exact size, rather than having to use oversize molds and allow for shrinkage.

A relatively unique process and product have been made possible because of the non-shrinking feature of vinyl foam. It is possible first to slush mold a skin on a mold (which has been suitably embossed) and then pour in the plastisol and heat to form the foam sponge. After cooling and removal of the piece, a foam section is obtained covered with a leather-like skin. Thus, for applications requiring the upholstering of padding, this process would be far superior since only one molding operation would be needed.

Interconnected-cell vinyl foam is already being put to this use in the automotive field, both for armrests and for dashboard crash-paneling. Other uses include nonflammable pillows and mattresses, ordinary household sponges, packaging applications, and floor mat underlays. The oil resistance and flame resistance of vinyl sponge make it particularly useful where these properties are desired.

At present, gas-absorption plastisol foaming processes for making vinyl foam have been brought to the attention of the industry. Elastomer Chemical Corp. has developed a method where CO_2 gas is mixed and dissolved in the plastisol under pressure, and when the pressure is released, the mass expands. It is then gelled by heat. The Elastomer process (13)[2] uses gas pressures in excess of 100 psi.

The Interchemical Corp. has developed a method of making a vinyl foam from a plastisol which includes the ability of being extruded on to surfaces and expanded at elevated temperatures at atmospheric pressures (14). Several worthwhile applications for this method have been found, one of which is for the manufacture of a refrigerator gasketing material.

Polyurethane Foam

A new development that has received the attention of cellular rubber producers during the past several months is the polyurethane foam process. This process and product are an outgrowth of the work of O. Bayer and his coworkers; the original work was reported in the German chemical journals before World War II. High molecular weight compounds made by the addition of glycol to diisocyanates which could be spun as fibers (15) and drawn were described.

Later these Germans developed the esterification of dibasic acids with an excess of divalent and trivalent alcohols, and the subsequent reaction of these polyesters with diisocyanates produced elastic polymers known as Vulkollans (16). When the chain extension reaction of the polyesters with diisocyanates is carried out so that CO_2 is trapped in the material prior to complete crosslinking, the mass is foamed, and "Moltoprene"[9] or polyurethane foam is produced.

The chemistry of Airfoam SL,[10] which is an elastomeric polyurethane foam of interconnected cellular

[1] Presented before The Los Angeles Rubber Group, Inc., Los Angeles, Calif., Mar. 2, 1955. Concluded from our August issue, p. 610.

[2] Numbers in parentheses refer to bibliography items on p. 614 of our Aug., 1955, issue.

structure, is an extension of that used in making Chemigum SL[10] which started at the Goodyear research and development laboratories shortly after World War II (17). The polyester is first formed, preferably from a mixture of ethylene and propylene glycols treated with adipic acid.

If the glycols are represented by HO-A'-OH and adipic acid by HOOC-A-COOH, the polyester would be HO-A'-OOCA-COO—A'OH. In actual practice it is frequently desirable to use more than one glycol in the polyesterification. It is only necessary to remember that the OH groups at the ends of the polyester chains actively combine with the other important chemical used in the process, the polyisocyanate, in the next step of further lengthening the molecular chain.

Among the polyisocyanates used, the diisocyanates, which may be represented by OCN-R-NCO, have been found to be very useful. When they combine with the polyester, the result is multiplication of the chain length as shown by the following schematic formula (18):

$$OCN-R-NCO \quad (DIISOCYANATE)$$

$$AND$$

$$HO-A'-OOC-A-COO-----A'-OH \quad (POLYESTER)$$

$$GIVE$$

$$OCN-R-NHCOO-Polyester-OCONH-R-----NCO$$

After the long-chain molecules are made, various chemicals such as diamines, glycol, and water are used to bridge and tie the long-chain molecules together, and this process results in the tough elastomer known as Chemigum SL.

Airfoam SL is produced by making certain modifications and additions at this last step so that a gas is formed in the viscous mass. The chemically formed gas causes the mass to expand simultaneously with the cross-bridging reaction. When the reaction is completed, a lightweight foam is produced.

Airfoam SL is snow-white in color, with the appearance of sparkling ice crystals showing on a freshly cut surface. Airfoam SL, however, can be made in a vast assortment of colors.

The cell structure of Airfoam SL resembles a number of small rubber balls packed closely together. The size of these spherical cells can be varied from a size hardly visible to the naked eye up to ones exceeding ¼-inch in diameter.

The compression of Airfoam SL may be varied greatly by changing the proportions of the chemicals used. A high compression/low density foam having good stress/strain properties may be produced. Also, low compression foams with lower densities than is customary with latex foams can be made.

[9] German trade mark.

[10] Trade marks of Goodyear Tire & Rubber Co., for foamed and solid polyurethane rubber.

Physical Properties of Latex, Rubber, Vinyl and Polyurethane Foams Compared

When one discusses physical properties of foams used primarily for cushioning purposes, the most essential characteristic to consider first is that of compression. A foam may have good "feel," high stress/strain properties, and the most beautiful cellular structure ever made by man, but if the compression per unit density is too low, the foam is uneconomical to produce. In the case of latex foam rubber the compression is increased by increasing the quantity of rubber and decreasing the volume of air. Some progress has been made in increasing the compression of latex foam by use of resin latices and fillers. When these are used, other changes occur in the physical properties which, in most cases, are not desirable.

The compression of vinyl foam may be varied over a wide range by selecting the type of plasticizer to be used and by varying its quantity. This is graphically shown in Figure 3, where the three elastomeric interconnected cell foams are compared. (With vinyl foam, the variation in plasticizer type and amount actually resulted in such a wide range in values for RMA compression[11] that a curve could not be drawn through the points in Figure 3.)

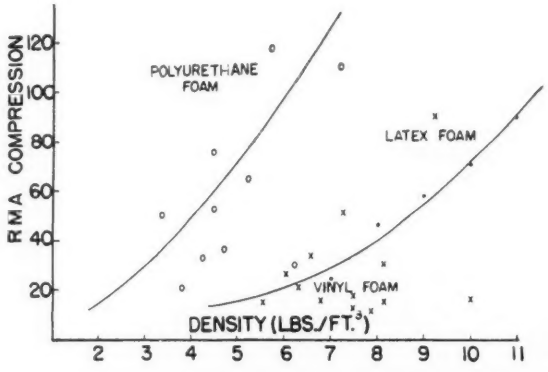


Fig. 3. Compression/density of interconnected cellular-type flexible foams

As the vinyl foam increases in compression, it becomes very coarse in structure and harsh in feel. Actually, it no longer is an elastomeric flexible foam as we usually think of it. This testing of the foams reported in Figure 3 was done at room temperature. At a lower temperature high-compression, low-density type of vinyl foam would become very brittle. A considerable improvement has been achieved, however, in vinyl foam properties during the last year, and real progress has been made.

The polyurethane foam has a much higher compression density ratio as compared to latex rubber foam and vinyl foam. The compression of polyurethane foam can be increased by increasing the quantity of the polyisocyanate used. As the compression increases up to 130 pounds, the flexibility decreases somewhat, and the foam

[11] "The RMA Buyers Specification of Latex Foam, April 1, 1953." Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y.

has a harsher feel, but not nearly so bad as for the vinyl foam at 130 pounds' compression.

Next to compression the most important characteristic to consider is the long-term aging life of the foam elastomer. When properly used for cushioning, which means that the cushion has to be covered in order to reduce or eliminate light, latex foam rubber gives very good service. Several of the first mattresses which were produced in 1936 are still giving good service 18 years later.

Figure 4 depicts graphically the long-term accelerated oven aging properties of vinyl foam, latex rubber foam, and polyurethane foam (8). The loss of plasticizer in the vinyl foam is the factor responsible for the increased compression during aging. With proper selection of plasticizers a good long-term aging vinyl foam can be made. The latex rubber foam becomes soft on aging, and then gradual resinification sets in, and the foam becomes brittle and hard. The Airfoam SL foam, which is a polyurethane elastomer, remains flexible over a period greater than 10 times that of vinyl and latex rubber foam. According to this testing procedure, the polyurethane is much better in aging life than either latex or vinyl foam.

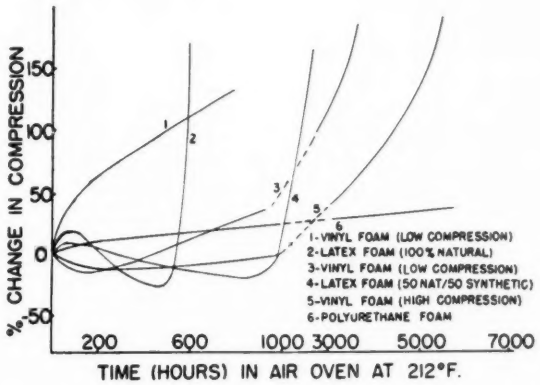


Fig. 4. Long-term oven aging of interconnected cellular-type flexible foams

A disadvantage of the polyurethane foam, however, is that it becomes darker in color during exposure to light. Also, if the polyurethane foam is not fully crosslinked, as sometimes happens with the soft compression foams, it is greatly affected by humidity and becomes tacky, and its physical properties degenerate.

Figure 5 shows the effect on compression of the various interconnected cellular foams under varying degrees of deflection. It will be observed that latex foam exhibits a constant increase in compression as the deflection is increased. The polyurethane foam has a higher compression rate change during the initial deflection increase; then it levels off. This phenomenon may be due to the character of the cellular structure of the polyurethane foam. It has a more spherical cell, and a large percentage of the spheres has been ruptured during processing. During the initial compression some force is required to push open the millions of little "valves" which were formed by rupture of the cells during processing. After these valves are once opened, the compression/deflection graph for polyurethanes parallels that for latex rubber foam.

Table 2 compares other physical properties of the three interconnected cellular foams. In order to simplify the comparisons, a latex foam rubber slab stock one inch thick with an RMA compression value of 30 pounds was selected. This compression may be considered as average in cushioning applications. The vinyl foam sample and the polyurethane foam sample were selected so that their RMA compressions were as close to 30 pounds as possible.

Fig. 5. Compression deflection values of flexible foams

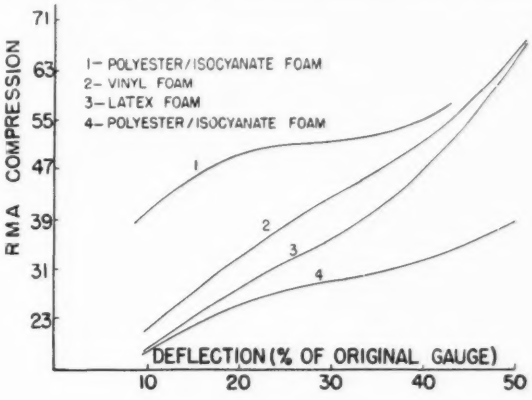
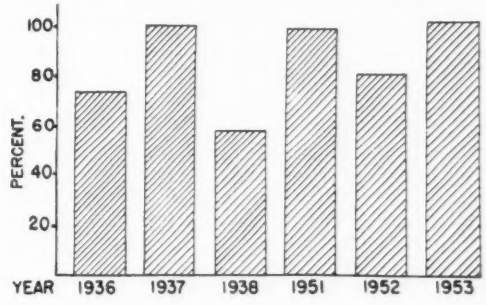


Fig. 6. Value trend of chemically blown sponge rubber production 1936-1938 and 1951-1953. (Represents only 20% of total production of sponge rubber during these periods since these were all the figures available. "Percent" figures are the dollar volume in percentage of this 20% of total production for the various years)



Sponge Rubber (Chemically Blown)

The oldest and best known branch of the elastomeric cellular family is sponge rubber. Time does not permit a description of the processing methods and physical characteristics of the huge variety of materials coming under this classification. The ASTM standard D1056-54T on sponge and expanded cellular rubber products lists a variety of classes and types of sponge rubber, depending on the type of rubber used, whether it is natural, reclaimed, synthetic, etc., and the physical properties of the various sponge rubbers, such as oil resistance with low swell, oil resistance with medium swell, etc.

TABLE 2. PROPERTIES OF INTERCONNECTED CELLULAR ELASTOMERIC FOAMS

	Latex Foam	Vinyl Foam	Polyurethane Foam
Density (lbs./ft.^{3})	6.8	7.0	2.3
RMA compression (lbs.)	30.0	34.0	35.0
Flame resistance	Burns	Does not burn, but melts	Resistant to burning, but melts
Tensile (lbs./in.^{2})	33.2	31.8	25.0
Elongation (%)	455	190	250
% (Change in original deflection at —30° F.)	0	80.5	56.0
Compression set at 158° F. (% retention)	94.0	81.8	92.0
Flex life			
Loss in compression after 50,000 flexes (%)	13.0	28.0	22.4
300,000 flexes (%)	15.0	35.0	22.4
Hysterisis loss (%)	23.2	44.8	57.8
Rebound (inches) (2.4-oz. one-inch diameter ball from 6-inch height, rebound in inches, using slab stock)	2.5	0.5	0.5

Swell Effects of Solvents (% Change)		Latex Foam		Vinyl Foam		Polyurethane Foam	
		Linear	Volume	Linear	Volume	Linear	Volume
A	Benzene	+53.5	263.0	+5.4	17.0	+25.0	93.7
B	Naphtha	+51.0	245.0	0	0.0	0	0.0
C	Ethyl alcohol	0	0.0	+1.8	5.3	+ 6.1	18.7
Effect of Solvents of Dry Volume Change (%)							
A	Benzene	0	0.0	—7.2	—20.0	0	0.0
B	Naphtha	0	0.0	0	0.0	0	0.0
C	Ethyl alcohol	0	0.0	—3.6	—10.6	0	0.0
Condition of Dry Foam after Solvent Soak							
A	Benzene	No change.	Flexible	Hard and brittle		No change.	Flexible
B	Naphtha	No change.	Flexible	Hard and brittle		No change.	Flexible
C	Ethyl alcohol	No change.	Flexible	Hard and brittle		No change.	Flexible

Figure 6 depicts the trend in business of a segment of the industry amounting to about 20% of the total volume of sponge rubber production for the years 1936-1938 and 1951-1953. Approximately 59% of the volume went into automobile manufacture. In 1947 there were 43,967,903 pounds of chemically blown sponge rubber produced, and this quantity represented a value of $21,081,000 (19). The automobile industry in 1947 produced 3,558,000 units, which would mean about seven pounds of sponge rubber per car. If the use per car of sponge remained the same, and we have every reason to believe it has not decreased, the automotive industry alone in 1953 would have consumed upward to 43,000,000 pounds of chemically blown elastomer.

Expanded or Closed-Pore Cellular Elastomers

Closed-cell rubbers, plastics, and rubber/plastic blends are made by subjecting the compound to a gas, preferably nitrogen, under high pressure. The gas dissolves and is soluble to a certain degree in the elastomer mass under these conditions. At a certain time during the operation the pressure is released, and the material expands into a mass of individual non-connecting gas cells. The gas may be generated in the plastic mass by incorporating gas-forming chemicals. The expanded elastomers are produced in sheets, molded shapes, and in a variety of designs.

Most expanded vinyl is made today by a closed-mold, high-pressure process. In brief, this consists of filling a steel mold with a milled stock, plastisol, or organosol (each containing a blowing agent) and heating the mold and contents to a temperature sufficient to gel the stock and decompose the blowing agent. This procedure develops high internal pressure, and a correspondingly high external pressure is therefore needed to prevent the escape of gas and stock from the mold. After thorough cooling of the piece, the external pressure is removed, and the foamed sample escapes from the mold. At this point the dimensions of the foamed piece are approximately 50% greater than those of the mold.

Expansion is completed by warming the piece, a process most important to the final size and physical properties. After the material has been removed from the mold, but prior to after-expansion, the pressure in the individual bubbles is well above atmospheric. To obtain maximum size the piece must be heated while unconfined. The plastic is thus softened, and this softening allows the nitrogen bubbles to expand against lessened resistance of the plastic mass. When the expanded vinyl is cooled to room temperature, there is some contraction due to the lower tempearture of the gas. The ultimate expansion factor obtained is, of course, dependent primarily upon the amount of blowing agent used, but can be varied within limits by the after-expansion time and temperature. After-expansion heating can be accomplished in a hot air oven, or by immersion into a hot liquid. The final volume of an expanded piece may be as much as 30 times the volume of the original stock.

To date a great percentage of the expanded cellular elastomeric materials have been used for flotation gear and buoyancy applications. Other uses which have been developed are: (a) replacement for springs or undercushioning for seats, sofas, and the like; (b) for shock absorbing purposes such at turret linings, tank linings, aircraft ejection seats, and crash helmets; (c) for vibration dampening of instruments both in mounting and shipping; and (d) for insulation wherever low thermal conductivity is desired. The development and use of expanded cellular elastomeric materials are in their infancy, but have promise of a great future.

Summary and Conclusions

After an examination of the properties of these various elastomeric cellular materials the question naturally arises as to where they can be used best by the consumer so as to take advantage of their several outstanding and unique properties. Latex rubber foam is presently being used for seat cushioning and as a heat sealing fabric trim for seat covers. Polyurethane foam may also be used in these types of application. The factors determining the acceptance of any foam material are cost, ease of fabricating, and quality of the cushioning performance. At the present time latex foam rubber has an advantage on all of these counts.

The outstanding fire resistance of polyurethane foam gives it an advantage over latex rubber foam for public transportation cushioning and other aircraft uses. Because this-type foam can be made to a high compression with a comparatively low density it may have possible application as automobile mat underlay material. Its high compression/density factor may also make it attractive for protective headgear for sports, etc., and use in decorative paneling in interior building construction. With the advent of air conditioning in automobiles, better insulation against outside heat is provided by the use of polyurethane foam under the car roof.

The relatively poor compression set of vinyl foam may prevent it from becoming a serious factor in cushioning applications. However, as decorative side panels, armrests, crash pads, and trim materials, it offers the designer and stylist many possibilities. These foams can be made in a wide variety of colors and shades.

The question that is perhaps uppermost in everyone's mind is just where and how will these various foams fare in the competition for the cushioning market. As it appears now, we think the development and application of these foams will be somewhat similar to the recent developments in the field of textile fibers. Cotton still remains the major fiber even with the amazing developments in rayon, nylon, Dacron, and a host of other fibers. Similarly, latex rubber foam today remains supreme in the cushioning market.

The newer-type foam materials have some properties that make them better suited for certain applications, and there is an excellent possibility that they will grow to substantial volumes. In the beginning, starting from practically nothing, their growth will be very rapid, since there is always tremendous room for expansion for all worthwhile products.

Sponge rubber and expanded cellular materials have achieved a secure status in our economy over a period of years. With the improvements being made in the present elastomers and with new elastomers continually being developed, an interesting and profitable future appears to lie in store for these materials.

Industrial Research

(*Continued from page 752*)

report which records the fact that as the rubber and plastics industry has progressed in science and technology, it has also progressed in the science and technology of research, development, and customer service. It is also important that we appreciate the acceptance by our respective managements of the responsibility for the consequences of technical progress. Their increasing use of the yardstick of service as well as profit will insure real progress and economic prosperity in our industry.

Bibliography

(1) "Chemistry and Technology of Rubber," p. 619. C. C. Davis, J. T. Blake. Reinhold Publishing Corp., New York (1937).
(2) S. Peal, British patent No. 1,801 (1791).
(3) T. Hancock, British patent No. 9,952 (1843).
(4) C. Faraday, *Quart. J. Sci.*, 21, 19 (1826).
(5) G. Williams, *Proc. Roy. Soc.*, 516 (1860).
(6) K. Gottlob, *India Rubber J.*, 58, 305 (1919).
(7) W. L. Semon, United States patent No. 1,929,453 (1933).
(8) J. C. Patrick, U. S. patent No. 1,890,191 (1932); *Trans. Faraday Soc.*, 32, 347 (1936).
(9) W. H. Carothers, I. Williams, A. M. Collins, J. E. Kirby, *J. Am. Chem. Soc.*, 53, 4203 (1931).
(10) J. A. Nieuwland, W. S. Calcott, F. B. Downing, A. S. Carter, *Ibid.*, 53, 4197 (1931).
(11) E. Konrad, E. Tschunker, British patent No. 360,821 (1930).
(12) R. M. Thomas, U. S. patent No. 2,273,158 (1939); W. J. Sparks, R. M. Thomas, U. S. patent No. 2,356,129 (1944).
(13) W. D. Todd, *Modern Plastics*, 27, 111 (1949).
C. A. Clark, H. E. Conners, *Rubber Age (N. Y.)*, 72, 343 (1952).
(14) R. Morrisey, *Ind. Eng. Chem.*, 47, 8, 1562 (1955).
G. W. Kuckro, H. G. Womack, *Wire & Wire Products*, 30, 768 (1955).
(15) G. Ebert, F. A. Fries, P. Garbach, German patent No. 532, 455 (1929).
"Synthetic Rubber from Alcohol." A. Talalay, M. Magat. Interscience Publishers, Inc., New York (1945).

Voit's Flexible Radiator Hose

W. J. Voit Corp., Los Angeles, Calif., has developed an improved line of machine-molded flexible radiator hose, which is featured by all-neoprene construction with Du Pont "Hypalon" coating inside and out to improve resistance to aging and weather-checking.

The new Voit hose also offers integrally molded tempered steel springs and reinforced fabric ends to provide an extra protection against clamp tear and wear. Length tolerance is held to ⅛-inch by new machine molding methods. The product's thick molded walls also give the hose a high hydrostatic capacity.

The new hose line is an advanced version of the flexible hose Voit first introduced in 1951 and has been tested at the Indianapolis 500-mile racing classic for the past five years. The Voit hose has never failed in this test.

The new product was used in more than 500,000 miles of driving on a fleet of 40 trucks, where total engine running time exceeded 225,000 hours, and not one failure was recorded in this test either. In addition, the Voit hose was subjected to a variety of laboratory tests.

Low-Temperature Evaluation of Tires[1]

By C. W. BANTON, JR., and C. F. DANDAREAU, JR.

U. S. Army, Ordnance Corps, Detroit Arsenal, Center Line, Mich.

Solid tires and pneumatic tires and tubes were tested at temperatures down to —65° F. on a Bureau of Standards tire test machine at the Detroit Arsenal of the U. S. Army, Ordnance Corps.

Both special construction and regular-production pneumatic tires were tested. It was concluded that solid tire and pneumatic tire and tube performance in accordance with Ordnance objectives can be obtained with curent polymers and compounding materials.

IT IS the objective of the Department of the Army that all military vehicles be capable of satisfactory performance at temperatures ranging from —65 to +125° F. Besides these vehicles must be operable after storage at temperatures from —80 to +160° F.

It has become necessary for the Ordnance Corps to provide a method for determining the ability of vehicles and components to conform with these requirements. Climatic test stations have been established in both temperature extremes. This method has proved expensive both with respect to the cost of maintaining the test fleet and the limited number of tests that can be conducted, particularly at sub-zero temperatures.

For low-temperature performance testing, therefore, extensive laboratory facilities have been provided for the evaluation of both vehicles and components. One such facility was constructed at the Detroit Arsenal in 1950. This cold room has sufficient area to permit evaluation of Ordnance vehicles, from the Jeep to the 48-ton tank, at temperatures from +40 to —70° F. In addition, smaller cells are available for testing components at temperatures as low as —100° F.

The purpose of this paper is to describe test equipment, and procedures as well as the results obtained in evaluations of pneumatic tires, tubes, and solid tires.

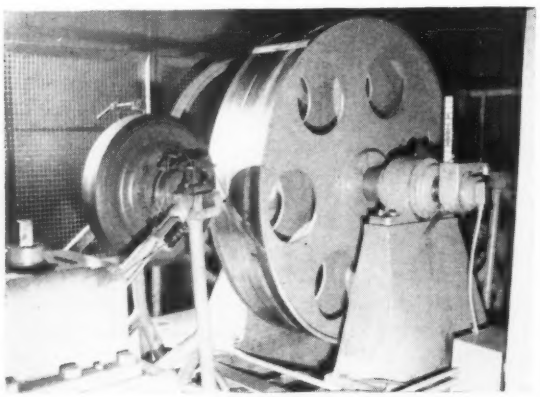


Fig. 1. Portable tire test wheel with drum cleats. Solid roadwheel tire undergoing test at low temperature in this instance

Description of Equipment

It was considered necessary to test the complete tire to determine the effects of low temperature with respect to brittleness, cord fatigue, separation, and other service characteristics. It was further concluded that the test should be dynamic in nature. An air-spring loaded, Bureau of Standards type, tire test machine was available at the Detroit Arsenal and was used as the primary piece of test equipment.

Because of the standard acceptance test work-load, it was necessary to have the test machine available for both low-and-elevated-temperature operation. A wheeled frame, Figure 1, was designed and constructed that permitted moving the equipment as required. The combination of frame and machine was 24 feet long, nine feet wide, and weighed approximately 30,000 pounds. Quick disconnects were provided for all electrical, air and hydraulic services, and duplicate instrument panels were installed in each test area. With these provisions it was possible to relocate the equipent within 48 to 72 hours.

The rubber components of the test machine, V-belts, air-springs, and air hose, were especially constructed for low-temperature service. The complete test machine, including the drive motor and carriage, was disassembled and lubricated with Ordnance all-purpose lubricant. Components that could not be satisfactorily modified or lubricated, such as solenoids, tachometer generators, and speed-control motors, were provided with individual heating units, or eliminated entirely. Remote instrumentation was provided for temperature and load measurement.

Durometers were lubricated and calibrated for low-temperature operation. Standard bourdon tube-type pressure gages were used for tire-pressue measurments, but were brought into the cold room only for the time required for use. Hand tools, required for mounting test assemblies and adjusting test equipment, were kept in the cold room to eliminate frosting and rust damage. Special moisture traps and silica gel driers were installed in the air supply lines to minimize frost accumulation in the loading devices.

[1]This paper was presented before the Division of Rubber Chemistry, American Chemical Society, Detroit, Mich., May 4, 1955.

Fixtures were designed and fabricated for conditioning tires under constant load and constant deflection. These were used whenever possible to permit maximum use of the test machine during the periods at which the desired test temperatures were available.

Personnel were furnished with special clothing consisting of an insulated jumper suit with fur-lined hood, nylon, wool, and leather gloves, fleece-lined and insulated boots, and surgical face masks.

Test Methods Used

The first low-temperature tests were conducted on roadwheel tires. These are solid tires bonded to metal rims and are used on track-laying vehicles. The tires were conditioned under load to duplicate field storage conditions prior to test on the smooth drum. Conditioning times ranged from three to 672 hours in an attempt to determine the effect of extended storage on tire performance. Additional tests were conducted on tires conditioned without load after standard ⅜-inch cleats were mounted on the test drum. Initial tests were conducted at 6,500 pounds' total axle load; later tests were conducted at 4,500 pounds' load because of test machine failure at the higher load. Ambient temperatures ranged from —40 to —62° F.

The first pneumatic tire tests were concerned with a comparison of rayon and cotton cord performance in four-ply passenger tires at —65° F. Tires of similar construction were tested at 0° F. to obtain a comparison of carcass fatigue life. Natural rubber tubes were used in all of these investigations to eliminate failures extreneous to actual tire performance.

The most recent test series consisted of a general evaluation of military tires and tubes, both special construction and regular production (NDCC non-directional cross-country tires), at —40 and —65° F. Test conditions of load and inflation were an approximation of those used in Arctic operation. Maximum test speed at —65° F. was 12½ miles per hour because of test machine limitations. At —40° F. it was possible to obtain speeds of 40 miles per hour with both light and heavy-duty tires. Tests were conducted on both the smooth and cleated test drum after a variety of preconditioning procedures. One natural rubber tire, 11.00-20, 12-ply rated, was tested to determine the effect of extended storage on tire performance.

Additional laboratory tests were conducted on specimens cut from the tires and tubes to determine brittle temperature and temperature-retraction characteristics.[2]

Results and Discussion

All-solid roadwheel tires conditioned under load completed the drum test without damage to either tire or wheel. A relative measure of tire performance was obtained by comparing the time required to run-out the flat-spots developed during cold-conditioning. Reducing test temperatures from —30 to —62° F. had little effect on tire performance. Extending conditioning from 72 hours to more than 672 hours doubled recovery time, from 10 to 20 minutes. The values obtained were of questionable accuracy because it was difficult to distinguish between the vibrations caused by the flat-spot and those caused by mounting eccentricities, as the effects of the flat-spot diminished.

Since recovery times differed by only five minutes during the short-term tests, it was concluded that test conditions would have to be revised to obtain better differentiation between performance levels. Conditioning under load was discontinued, and the tires were tested on the cleated wheel.

Solid Tire Tests

With ambient temperatures of —62° F., regular production roadwheels manufactured from 122° F. GR-S developed failures similar to that shown in Figure 2.

Fig. 2. Sidewall failure or chunking of solid roadwheel tires when tested at —62° F. on the cleated wheel

Brittle temperatures of these tires ranged from —45 to —58° F. Other regular production tires, compounded with 41° F. GR-S and plasticizers with low-pour-points, had brittle temperatures of —74 to —90° F. and performed satisfactorily.

Experimental tires, compounded with 122° F. GR-S and special plasticizers, completed the drum test with only minor surface cuts and cracks. Brittle temperatures of these compounds, as determined in the laboratory at an impact velocity of 6.5 feet per second, were slightly lower than —65° F.

Since the brittle temperature is a function of the impact velocity, the minor failures of tires with brittle temperatures lower than —62° F. emphasized the necessity of establishing brittle temperature criteria consistent with the performance requirements of the end-item.

The failures occuring during this test series were not of sufficient magnitude to cause immediate interference with vehicle performance. Failures of this type decrease the ultimate service life of the tire because the remaining portion of the tire must carry a greater load.

First Pneumatic Tests

At —65° F. the performance of lightweight pneumatic passenger tires constructed with rayon cord was superior to that of tires constructed with cotton cord. Three rayon tires completed the conditioning and testing cycles without failure of tread, carcass, or sidewall. The maximum number of cycles[3] for any one tire was

[2]Evaluating low-temperature characteristics of rubber and rubber-like materials by a temperature retraction test (TR Test). ASTM D1329-54T, "ASTM Standards on Rubber Products, December, 1954," p. 579. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

[3]Cycle here refers to complete test, that is, both conditioning and dynamic tests.

four. The three cotton constructions failed; two on the first cycle, and one during the second cycle. It is probable that partial failure occurred during the first cycle in the instance where two cycles were required for failure. In the static load-deflection tests of these tires the rayon tire deflected more rapidly than the cotton tire. Deflection per unit load was also greater for the rayon tire.

The fatigue resistance of cotton cord tires conditioned and tested at 0° F. was superior to that of rayon tires. The failures were identical with those occurring in the field when operational temperatures were predominantly in this range. Rayon tire deflections, as determined in the static tests, were greater than those of the cotton tire as in the tests conducted at —65° F. This factor was at least partially responsible for the more rapid failure of the rayon tire.

The standard 7.00-16 and 11.00-20 tactical tires recovered from flat-spotting at —40° F. without damage, as did the special Arctic tires. These tests were all conducted on the smooth test drum. The tests were started with the tires under load to maintain relatively uniform impact conditions for all test specimens.

The cold-stiffening of the tires at the start of the drum test was sufficient to overcome the decrease in tire pressure resulting from the low temperature. The rolling resistance of the tire, as indicated by test-machine power requirements, increased 250% after only three minutes' operation. Thirty-five minutes were required for the inflation pressure to rise sufficiently to reduce power requirements to normal. It is readily seen that this condition will have a significant effect on vehicles operating under conditions that are not conducive to efficient performance. Military vehicles are equipped with air compressors that can be used to increase tire pressure when flotation is not of primary importance. Conversely, flotation will be decreased because of cold-stiffening of the carcass.

Butyl Inner Tube Tests

Butyl inner tube performance at —40° F. was unsatisfactory. The tubes did not brittle fracture, but were extremely stiff and difficult to handle. The cold-stiffening resulted in the formation of cold buckles in the lightweight tubes similar to those shown in Figure 3. These cold buckles formed more rapidly as inflation pressures were lowered.

The heavier gage tubes, 11.00-20, did not cold-buckle at temperatures down to —65° F. From the results of this test it was concluded that increasing the wall gage of pneumatic tubes would minimize cold buckling. Improving the elasticity of the tube compounds at the lower temperatures would also decrease buckling tendencies.

Butyl tubes were flexible at —65° F., but had very little impact resistance. In both the inflated and deflated condition the tubes would brittle fracture if allowed to drop freely to a solid surface from a height of only two feet. In recent developments improved elastic properties of Butyl inner tubes have been obtained with plasticizers not subject to extreme viscosity increase at the depressed temperatures.

Recent Pneumatic Tire Tests

All pneumatic tire tests at —65° F. were conducted on the cleated wheel at 12.5 mph with loads and inflations equivalent to those used in sand and snow operation. Only regular-production light truck tires were tested, and the maximum life for any tire was two conditioning and testing cycles. Where two cycles were required for absolute failure, a failure of the inner plies occurred during the first cycle, and during the second cycle the remaining plies failed, as well as the tread and sidewall compounds. This performance was similar to that of the four-ply cotton tires at —62° F. Since these light truck tires were all of rayon construction, factors other than substitution of rayon for cotton cord were responsible for the satisfactory performance of the rayon cord tires in the previous tests.

Heavy-duty truck and bus tires, regular production as well as Arctic construction, were tested on the cleated wheel. Two standard tires, compounded with 41° F. GR-S were selected for test because two extremes of tread brittle temperature were represented, —50 and —65° F. The tread and the sidewall of the former failed soon after the test was started. The tread flaked off, and cracks developed in the shoulders, as shown in Figure 4.

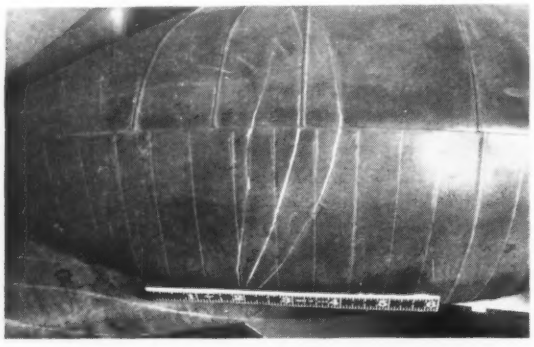


Fig. 3. Cold buckling of Butyl tube during tire and tube test at —40° F., at 40 mph, 17 psi. inflation, after six cycles

Fig. 4. Tread failure and cracking of regular-production heavy-duty truck and bus tire when tested at —65° F. on cleated wheel for 23 minutes at 12.5 mph. Brittle temperature of tread compound was —50° F.

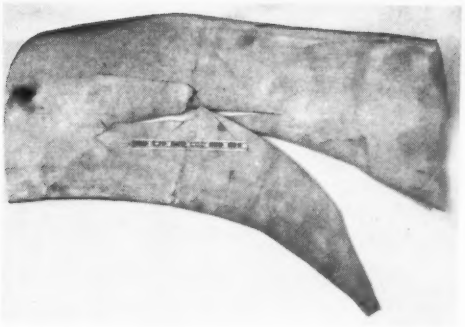


Fig. 5. Inner tube failure in low-temperature testing (—65° F.) of regular-production heavy-duty truck and bus tire when tested on cleated wheel at —65° F. for four cycles at 12.5 mph.

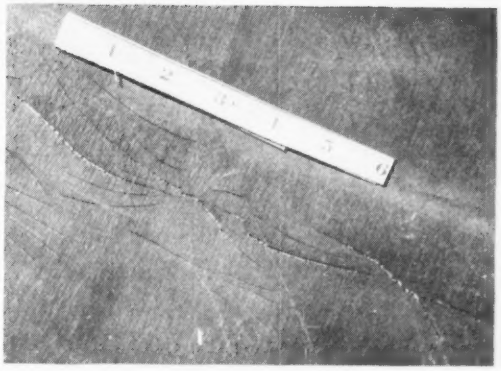


Fig. 6. Carcass failure at —65° F. of regular-production heavy-duty truck and bus tire. Brittle temperature of tread compound for this tire was —65° F.

At the conclusion of the test, however, the carcass cord and compound were still intact.

The tread and sidewall of the second (—65° F. brittle point) tire did not fail during four test cycles. The inner tube failed during the fourth cycle, as shown in Figure 5. Further examination of this second tire revealed that the first four plies of the tire had failed, as shown in Figure 6. Failures in both tire and tube were initiated on the internal surfaces, the location of maximum strain.

Fourteen minutes of drum-test operation were required to soften the complete tire and eliminate the major vibrations resulting from the inability of the tire to absorb the drum cleats. This softening was progressive, and visual observation of tire performance indicated that the crown was relieved in six minutes, the shoulder after nine minutes, and complete flexibility was attained after 14 minutes. This preliminary increase in crown flexibility may increase the susceptibility of the shoulder and bead area to brittle failure when terrain conditions are exceptionally severe.

Two 11.00-20 tires constructed specifically for Arctic performance were included in this test series. One of these tires was tested without other preconditioning and was sufficiently flexible after only three minutes of operation to absorb completely the drum cleats without excessive vibration.

A control tire, manufactured by the same company, required 14 minutes to soften, which was similar to the tires previously discussed. Both the control and Arctic tires were subjected to five test cycles, six hours' conditioning, and 30 minutes' running, without failure of any components in this test. A 24-hour endurance run was also completed without failure. The maximum temperature attained during the test series was 73° F. Two tube failures developed in the Arctic construction, emphasizing the requirement for improved Butyl tube low-temperature performance.

A second set of tires, Arctic and standard construction, manufactured by the same company, were subjected to the standard 47-hour acceptance test[4] prior to the low-temperature testing. This was done to determine if there would be any noticeable change in performance because of plasticizer loss. This limited preconditioning had very little effect on tire performance. The band-ply skim-coat in the standard tire incurred very minute cracks, but the cord was undamaged.

One natural rubber heavy-duty truck tire was tested to determine the effects of extended conditioning on tire performance. The tire was conditioned for 30 days at a deflection equivalent to 120% load. The conditioning temperature was —13° F., the temperature found by other investigators to be optimum for phase change (crystallization).[5]

When the tire was removed from the flat-spotting fixture, there was only slight recovery of the deformed section of the tire. The Shore C hardness of the tire at this time was 45, with a 10-second reading of 35. Approximately 14 minutes were required for the tire to soften sufficiently to operate without excessive vibration on the cleated wheel. The tire was then cold-soaked for 33 hours at —65° F. The hardness was then 87, with a 10-second reading of 50.

This natural rubber tire then ran smoothly on the cleated wheel after only two minutes' operation. The drum test was continued for an additional two hours, at which time the temperature had risen to 30° F. The deformation caused by the extended conditioning was not measurably smaller than at the time the restraining fixture was removed.

Summary and Conclusions

The results of these investigations indicate that solid tire and pneumatic tire and tube performance in accordance with Ordnance objectives can be obtained with current polymers and compounding materials.

The authors wish to thank the Detroit Arsenal for permission to publish the results of this investigation.

[4] STANDARD 47-HOUR ACCEPTANCE TEST:

Speed		30 mph
Room temperature		100 ± 5° F.
Initial inflation pressure		70 psig.
Load	3,600 lbs. (80%)	7 hrs.
	4,500 lbs. (100%)	16 hrs.
	5,400 lbs. (120%)	24 hrs.

[5] L. A. Wood, N. Bekkedahl, *J. Research, Natl. Bur. Standards*, June, 1946.

EDITORIALS

"Looking Ahead to 1960"

WE HAVE taken the liberty of using the above title for this editorial from P. W. Litchfield's "Notes on America's Rubber Industry," of June 30, 1951, since we feel it is particularly appropriate again at this time. The postwar boom in the rubber industry in the United States has become so strong recently, and with the record consumption of 136,000 long tons of new rubber in June of this year, we thought it might be of interest to review the probable supply-demand situation for the next five years.

Since 1946, total consumption of new rubber in the United States has been above one million tons annually, except for one year, and has been above 1,200,000 tons annually, except for three years. Consumption was 1,338,309 tons in 1953 and in 1955 is expected to be at least 1,400,000 tons and may even reach 1,500,000 tons. The July issue of the United States Department of Commerce publication, "Chemical and Rubber," reports that the number of plants making rubber products in this country has grown from 834 in 1946 to 1,196 in 1953, a gain of 43%.

Board Chairman Litchfield, of the Goodyear Tire & Rubber Co., predicted quite accurately in his 1951 report, a consumption of new rubber in this country in 1955 of about 1,400,000 tons. For 1960 he estimated then that U. S. consumption would be between 1,500,000 and 1,800,000 tons and urged new synthetic rubber facilities in view of the inability of natural rubber producers to increase capacity materially before 1960.

The record consumption in June of this year provided an indication of the maximum capacity of the U. S. industry to use new rubber. The somewhat more than 136,000 tons consumed in that month means a potential annual use rate of about 1,650,000 tons for any 12-month period.

Could this country obtain 1,650,000 tons of new rubber in any 12-month period if the consuming industry should require it in the near future? Synthetic rubber producing facilities in this country have an estimated total capacity of 1,028,000 tons a year, and with the probable reactivation of the 122,000-ton-a-year GR-S plant in Institute, W. Va., in the next few months, this total could be increased to 1,150,000 tons. Also, recently announced expansion plans of two GR-S type of rubber producers will add another 100,000 tons a year capacity to bring total synthetic capacity to 1,250,000 tons.

The annual capacity of existing natural rubber producing facilities may be estimated at about 1,850,000 long tons a year. Consumption of new rubber (mostly natural) outside the United States has been increasing rapidly, but does not exceed 1,200,000 tons a year. About 650,000 tons of natural rubber are therefore available to this country for direct use and stockpiling, which means that the supply-demand situation is about in balance for the next year or two.

However, consumption of new rubber both in the U. S. and abroad increased almost 10% a year between 1940 and 1950. World consumption between 1950 and 1960 will probably increase at about 4% a year.

On this basis, a conservative estimate would put world consumption in 1960 at 3,400,000 tons, about equally divided between the U. S. and the rest of the world. Synthetic rubber production will have to be at a 1,500,000 annual rate, and natural rubber production at a 1,900,000 annual rate to take care of this demand.

R. G. Seaman

EDITOR

Meetings and Reports

Details of Akron Symposium on Textiles and the Rubber Industry—I

The addresses of the seven panelists at the Akron Rubber Group's symposium on "Textiles and the Rubber Industry," held at the Mayflower Hotel, Akron, O., April 1, are digested below, together with the question-and-answer session which followed the prepared talks. A report of the speech delivered by James A. Farley at this meeting was published in our May issue (page 219).

Moderator of the symposium was T. M. Kersker, manager of textiles and adhesives, The Firestone Tire & Rubber Co. The panelists and the titles of their addresses follow: W. L. Smith, technical director, industrial products division, The B. F. Goodrich Co., "Textiles and Industrial Products"; Phil W. Drew, manager of fabric development, The Goodyear Tire & Rubber Co., "Textiles and the Tire Industry"; L. W. Reeves, manager of chemical sales, The General Tire & Rubber Co., "The Problem of Textile Adhesives"; John Hagen, technical assistant to the president, Callaway Mills, Inc., "Design of Engineering of Fabrics to End-Use Applications"; Arthur Baker, manager of tire yarn service of textile unit, American Viscose Corp., "Use of Rayons in Tires and Industrial Products"; Russell W. Peterson, manager of industrial merchandising, textile fiber department, E. I. du Pont de Nemours & Co., Inc., "Use of Non-Cellulosic Synthetic Fibers in Tires and Industrial Products"; and H. S. Grew, Jr., vice president, Wellington Sears Co., Inc., "Historical Sketch of Textiles Other Than Cords for the Rubber Industry."

Introductory Remarks

T. M. Kersker
The Firestone Tire & Rubber Co.

I have boundless enthusiasm about the future of textiles in the rubber industry because of the continued increase in the production of rubber and plastic products which use textiles, because of the many new textile materials which are being developed constantly, and because of the interesting and challenging problems involved in using these new materials to make better, lower-cost products.

Rubber made an early marriage with textiles when the Indians of South America smeared sticky latex on cloth to make water-resistant clothing and footwear. Since then the union has prospered until today approximately 450 millions of dollars worth of textiles are used each year by the rubber industry.

Cotton, rayon, nylon, other textiles and wire, add desirable properties such as strength, stability, and toughness to a variety of rubber products. Chief among these are tires, hose, and belts.

Today our panel is made up of outstanding men, well qualified to answer the multitude of questions submitted.

Textiles and Industrial Products

W. L. Smith
The B. F. Goodrich Co.

Textiles are an essential component of a variety of industrial rubber products. Hose and belts are not only the largest consumers of textiles, but require a wide variety of yarns, cords, and fabrics designed for the ultimate end-use. Textile materials are used in hose and belting most frequently as tension members to absorb and distribute stresses encountered in service. In a hose the tension members must withstand the stress of internal pressure (or lack thereof) and the movement of the hose in service. For belts the tension member must carry the load and/or transmit power as well as absorb shocks met.

No reliable data are available on the increasing use of hose and belts, but this segment has kept pace with the expanding industrial economy of the country. This increased use of hose and belts required improvements be made in textiles, their design, and manufacture, as well as improvements in rubber technology, manufacturing methods, and aggressive merchandising.

The manufacture of industrial rubber products west of the Alleghenies started in 1870 when Dr. B. F. Goodrich produced cotton reinforced fire hose at Akron. During the next 70 years cotton was the principal textile used, supplemented by linen, asbestos, and other fibrous materials. Yarns and cords were introduced, and improvements made in the design of woven fabrics for belts and hose. Braiders, circular looms, and knitters were also developed for applying textiles to hose.

During recent years other textiles have become available, such as rayon, nylon, fiberglass, Dacron,[1] and Fortisan 36.[2] Use of wire, not normally considered a textile material, as a reinforcing material in hose preceded these new textiles by several years and is now being used in V-belts and conveyor belts for high-tension installations. Wire has been used for years as an additional reinforcing member for cotton in the manufacture of suction, vacuum, and rotary drillers hose.

Just as GR-S type, nitrile, Butyl, and neoprene rubbers have broadened the utility of the elastomeric component, so have fibers widened the horizons for the design engineer. These new fibers meet the requirements for higher strength, reduced bulk, lighter weight, and better performance. For example, through the use of synthetic fibers in fire hose jackets, it has been possible to reduce weight 30-35% while maintaining the burst strength. The use of the newer synthetic fibers has permitted the design of belts with good troughing characteristics for operating at significantly higher working tensions than was possible with cotton.

As explained earlier, progress has been made in the textiles used in hose and belts. Various combinations of properties, however, are required for different end-uses. The most important include good tensile strength, definite elongation characteristics, good flex cracking resistance and a high ratio of shear strength to tensile, dimensional stability under a wide range of temperatures and humidities, minimum changes in tensile under different conditions of temperature and moisture, adhesion to rubber, good age resistance, flame resistance, and freedom from growth under load.

No textile material can have the optimum balance of all these properties; therefore the design engineer must select the textile having the best combination of properties for any hose or belt product. Development work must continue on textiles and their applications. The rate of growth of the industrial rubber products industry can be influenced by effective interchange of information between textile supplier and user.

[1] E. I. du Pont de Nemours & Co., Inc.
[2] Celanese Corp. of America.

Textiles and the Tire Industry

Phil W. Drew

The Goodyear Tire & Rubber Co.

The relatively recent use of textiles in tires now represents the largest single end-use for synthetic fibers. Without textiles we would still be in the solid tire stage. The pneumatic tire, as we know it today, is largely dependent upon fabric for load carrying capacity, impact resistance, tire shape, and tire size stability. The first pneumatics used cotton fabrics and, later, cotton cords. Cotton cord fabric was used almost exclusively until 1935 when rayon cord truck tires were first advertised.

Rayon had better strength, especially at high operating temperatures, largely because of its continuous filament structure. This material and construction became popular in natural rubber truck tires for severe service usage. With the introduction of synthetic rubber tires during World War II, the high operating temperatures developed with this material forced the use of rayon in more and more tires.

During our desperate struggle to make enough satisfactory tires and rayon for the war effort, the denier[3] sizes were increased from 275 to 1,100, then to 2,200 in order to increase the rayon industry capacity. After the war it appeared that the 2,200 denier was too large for the best tire performance. This size was pulled down during spinning to 1,650 denier, which has become almost universal in rayon tires.

Rayon strength and fatigue resistance has been continually improved since the war's end. The latest improvement is the super tenacity type of materials. This improved high tenacity generally has 20% better tensile and 25% better fatigue resistance than standard types. Tire tests indicate that super-tenacity rayon gives even more advantage in tire service than the laboratory tests show.

The most recent new tire cord material is nylon Type 66. The strength and elasticity of this material made it interesting to the tire industry as soon as its qualities became known. In order to use this material in ground vehicle tires its tendency to stretch in service had to be controlled first. The first nylon ground vehicle tires were advertised for sale in 1947. As in the case of the early rayon tires, the early nylon tires were used in severe service conditions only. Now nylon 66 cords are in most premium tires and in almost all off-the-road types. Nylon's full use in tires and other rubber products, however, is still restricted by the comparative high cost of the fabric.

Many new fabrics have been developed that show possibilities for the next major improvement in tire cord. Among these are Dacron, Perlon,[4] or nylon Type 6, and various of the new high-strength rayons.

Of equal importance to the new fibers are new cord treatment methods. These generally include dipping, stretching, and heat treatment operations. These new methods are important for standard rayon and cotton cords, but essential for super-tenacity rayon and nylon fibers. The additive effect of the fiber and processing improvements is one of the most important factors in recent advances made in the performance of both conventional and tubeless tires.

The Problem of Adhesion

L. W. Reeves

The General Tire & Rubber Co.

Adhesion of rubber to fabrics was quite simple when cotton was the only material used. The smooth surfaces presented by rayon, nylon, and the other synthetic fibers made it necessary, however, to pretreat these fabrics to provide a surface to which rubber would readily adhere. Two principal materials are used to accomplish this adhesion. One is a rubber latex with resorcinol-formaldehyde resin; the other is a solvent cementing system incorporating isocyanates in the cement.

The resorcinol-formaldehyde latex treatment is by far the most common method because of its lower cost. It is used on practically all tire cord and most synthetic industrial fabrics.

The isocyanate method is used on closely woven synthetic fabrics where there is little or no chance of obtaining a "bite" into the spaces between the cords to assist adhesion. In such cases, also, the stiffness imparted to the fabric by resorcinol-formaldehyde resin is often objectionable. The isocyanate system does not involve the use of resins which will import such stiffness to the fabric.

Both the latex and the resorcinol-formaldehyde in an RFL system contribute to adhesion. The resorcinol-formaldehyde component seems to provide a fairly constant proportion of the degree of adhesion obtained. The kind of latex used is the variable factor. This point is illustrated on rayon tire cord by the following average adhesion values provided by various RFL dips where the resorcinol-formaldehyde proportion is held constant, and the kind of latex changed. The ratings give the approximate percentage of adhesion in comparison with the tensile strength of the cord:

	%
Hot polymerized GR-S type 2000 latex	60
Natural rubber latex	75
Cold polymerized GR-S type latex	85
Blend of 80% hot GR-S and 20% vinyl pyridine latex	95
Straight vinyl pyridine latex	100

Adhesion of rubber to nylon is more difficult. The same test applied to nylon is more difficult, but applied to nylon tire cord shows the following comparison of the effect of the latex:

	%
Hot polymerized GR-S type 2000 latex	45
Natural rubber latex	55
Cold polymerized GR-S type latex	70
80/20 blend of hot GR-S type and vinyl pyridine latex	80
Straight vinyl pyridine latex	100

Hot GR-S type latex alone has been practically abandoned because of its low adhesive values. Natural rubber provides better static adhesion, but its dynamic adhesion is poor. Cold GR-S type is fairly good on rayon, but too low on nlyon. The 80/20 blend of hot GR-S type and vinyl pyridine provides the best economic balance of adhesion and cost for rayon. The cost of nylon and expense of dipping and hot stretching make it wise to use a straight vinyl pyridine dip to insure full value from the nylon component of the product. It is important also that a dip not degrade the fibers, but should provide good fatigue life and process well in the dipping equipment and cure rapidly.

Fibers may be degraded during treatment by heat, chemical action, or both. Chemical degradation of rayon can result from excessively high pH dips. Natural rubber and cold GR-S, both being rather unstable, require high pH to provide adequate processing characteristics and can, therefore, be injurious to the fabric. Nylon is chemically attacked by free resorcinol at the temperatures used in the dipping and hot stretching. Therefore a slight excess of formaldehyde should be used in forming the RF resin to avoid the presence of free resorcinol.

The amount of resorcinol-formaldehyde resin used in the dip, as well as the kind of latex, can affect fatigue. Too much RF, which is a brittle, thermosetting resin, will result in a very stiff fabric with poor fatigue life. Too little will not provide the best adhesion, which in turn promotes poor fatigue. Extensive tests have shown that for tires about 13% of the dip solids should be RF. If the end product requires greater flexibility, and adhesion may be sacrificed, lower RF proportions can be used satisfactorily. For instance, in square-woven fabrics, 9% RF has been found sufficient.

The penetration of a dip is also a factor in fatigue life. Some penetration below the surface of the cord is desirable in order to provide adequate bonding. On the other hand, too much penetration tends to cause higher heat buildup in the cord, more stiffness, and higher abrasion, which in turn lead to earlier failure of the fibers. Penetration should be no more than necessary to obtain optimum bonding.

A clean running dip is important. Both the latex and the RF can influence this. GR-S 2000 type hot latex is a good work horse. Cold GR-S type latex and natural

[3] Number of grams per 9,000-meter length.
[4] German equivalent of nylon 6. Perlon T equivalent to nylon 66.

Pongracz, Akron, O.

Moderator, *left*, and seven panelists at Akron Rubber Group's symposium on textiles and the rubber industry

rubber are both more difficult to handle. A properly stabilized vinyl pyridine latex is even more stable than GR-S 2000.

The degree of reaction to which the resorcinol-formaldehyde resin is carried before being added to the latex has a major bearing on processing characteristics. A dip containing RF which has been reacted for six hours at 75-78° F. will run cleanest. The same degree of reaction, however, can be obtained in a shorter period at higher temperatures.

The adhesion of a dip does not develop, of course, until the curing of the end-product takes place. The dip borrows sufficient curatives from the surrounding stock. Efforts have been made to speed the cure of the rubber component of the dip by incorporating additional accelerators in order to build up rubber film strength quickly so that it can withstand the stresses created during curing and thus reduce blowing during cure. These efforts, however, have not produced particularly good results.

Vinyl pyridine latex has been termed an accelerating latex because it is fast curing in itself. A vinyl pyridine latex dip will develop a given degree of adhesion in about half the time of a hot GR-S type latex dip, and cold GR-S type latex dip is even slower. This fast-curing property has been valuable in reducing curing blowouts in conventional tires. It is now a more pronounced advantage in connection with tubeless tires. Most inner liners used in tubeless tires do not allow the trapped air to escape through the inside of the tire, resulting in more curing blowouts unless the adhesion of the dip is great enough to withstand the pressures developed by this entrapped air.

Design or Engineering of Textiles to End-Use Applications

John F. Hagen
Callaway Mills, Inc.

In the design of any engineered product it is necessary to know your raw materials as well as the end-use requirements and the available production facilities. In using cotton fibers we have the advantage of an extensive background of information and experience so that the safety margins which enter into engineering calculations can be moderate. The man-made fiber manufacturers, however, have done an excellent job in providing us with reliable data of the physical and chemical properties of their fibers and in helping us solve our processing problems. We, therefore, now have a good working knowledge of these newer fibers, but acquiring this status has not been easy, and the educational and evaluation work has been expensive.

Being chemical products, these newer textile fibers are more uniform in composition and characteristics. Being new, they have been frequently modified, thereby necessitating almost continuous effort to keep up with them. Now we have a number of chemically treated cottons coming along which will require more of this evaluation work.

The backbone of any textile used by the rubber industry is its tensile strength. It would not be too difficult to design the most economical fabric with the required total tensile strength or to distribute this strength in the required proportion between warp and filling. It would simply be necessary to select the fiber and yarns which cost the least per pound of tensile strength and then calculate the size of cord and thread construction which could be made at the lowest cost.

Many other factors, however, must be considered. The impact-type tensile strength fiber where the product is subjected to sudden heavy loads will require elongation or stretch characteristics; while in the more uniform continuous type of load, the growth or lengthening of the product under such loads must be provided against. Elongation may also be necessary to prevent a stiff or boardy product, although a too supple or raggy-type material will also usually be objectionable. The amount the fabric stretches and the speeed and degree with which it returns to its original length, not only at the break, but also at working loads which may be one-half break or even less, are other essentials of the engineered fabric.

As opposed to the required stretch, the dimensional stability or control of shrinkage due to heat, humidity, or other causes must be considered. Failure due to compression and shear is a factor which cannot be overlooked.

The gage or thickness of the fabric is usually a very definite matter, and the proper bonding or adhesion of the rubber to the fabric is a most necessary consideration. The natural adhesion or even the adhesion obtained by applying adhesive compounds to the fabric may have to be supplemented by an open weave in order to provide also for mechanical anchorage.

Resistance to heat, chemical fumes, weathering, mildew, insects, etc., has to be considered as well as modified con-

structions which may be necessary to compensate for fabric distortion if required to be treated, such as heat setting, prior to processing into rubber products.

Even after we have what we think is the ideal theoretical fabric, the mill may object because it may not fit into its operating schedule. Again, the rubber industry may say that it needs further redesigning to meet certain price limitations, or it needs more sales appeal, so we designed to include these factors.

Use of Rayon in Tires and Industrial Products

Arthur Baker

American Viscose Corp.

Rayon came into the tire picture at a most crucial period in our national and world history. Rayon allowed extended use of synthetic rubber when the natural rubber supply was all but cut off from us. Fabric used prior to that time was found unsuitable for use with synthetic rubber because of the very high heat generated by this material. At the close of hostilities rayon immediately found its spot in civilian fields. It is true that our experience with rayon in the tire industry has not been without difficulties. But what worthwhile product or service has not worked its way through trials and troubles before it has become firmly established?

Rayon has weathered many crises to come up as the work-horse material for fabrics in the rubber industry. It has an outstanding and enviable reputation in the transportation field today. Approximately 90% of all tires currently in use are made from rayon fabric. There has never been a period when the motoring public could feel as safe and as free from tire worries as it does today; nor has the tire purchaser ever received as much value for his dollar. Blowouts and other sudden tire failures which have so often resulted in great tragedies are, for all intents and purposes, non-existent today. There will always be a small number of such accidents regardless of materials used, for a certain element of our people always tries to get that extra life from tires that is just not there.

The foregoing remarks will probably be considered more applicable to the passenger tire field than to trucks, buses, and other uses. This is true, to a certain degree, but nevertheless safety cannot be overlooked in any transportation field. Truck owners are much more cost conscious than the average motorist.

The rayon industry can give as good or better dollar value to the majority of the tire users whether they be truck or bus operators, specialized equipment users, or motorists. We admit that there are a limited number of applications where we would hesitate to recommend rayon. We are striving to build characteristics into our yarns which will make them desirable for even these services, but this is not an accomplished fact at this time.

The use of rayon is by no means confined to tires. Its use in industrial and mechanical products has grown through the last few years until it is a real factor today. Hose, belting of all kinds, liners, and many other products manufactured or used by you are being made in great quantities from rayon. It can be engineered to give desirable characteristics for many special uses.

The recent introduction of the super rayons is evidence that we are not standing still, but are continuing to strive for better yarns. We have come a long way from the 3.0 grams per denier strength yarn of a few years ago to the 4.25 and 4.5 grams per denier yarn of today. We do not intend to stop there.

Use of Non-Cellulosic Synthetic Fibers in Tires and Industrial Products

Russell W. Peterson

E. I. du Pont de Nemours & Co., Inc.

The advent of nylon and other non-cellulosic man-made fibers has had a marked influence on the manufacture and utility of rubber industry products. It is interesting to note that the man who invented nylon, the first of the truly synthetic fibers, also played a major role in the development of another product of great value to the rubber industry—neoprene, the first general-purpose synthetic rubber. This man, of course, was Dr. Wallace Carothers, whose concern was fundamental research. Since Carothers' nylon is the only non-cellulosic synthetic fiber which has made a large contribution to the rubber industry, let's discuss it first.

Nylon's success depends on its outstanding properties of toughness, strength, fatigue life, impact strength, and resistance to moisture and high temperature. As for the most important rubber industry market, tires, there appears to be little question that pound for pound nylon is the best tire yarn that has ever been made.

The deterrent in the use of nylon has been price, but by taking advantage of nylon's greater utility per pound, you have been able to reduce markedly the amount of nylon per tire. Today many large tires can be made as economically from nylon as from rayon.

The nylon growth problem, of which we have all heard so much, rises primarily from the use of less cord per tire and thus is tied into the economic problem. Growth of the nylon fiber that occurs both during tire inflation and as a result of long-term creep can be minimized by proper hot stretching of the cord and by modified tire building techniques.

Analysis of commercial tires shows that today there is a wide variation in the industry in the effectiveness with which the growth of nylon tire cord is controlled. Rather than depending upon the existing techniques developed for the characteristics of rayon, an all-out effort must be made to devise cord-processing and tire-building techniques especially suited to the particular characteristics of nylon. When this is done, it is predicted that the amount of nylon per tire can be reduced still further while growth is still being kept under control. Analysis of the performance, technology, and economics of tire yarns makes it more and more apparent that nylon will play an increasingly important role in the tire industry and will constitute a significant challenge to the dominance now enjoyed by rayon.

In other rubber industry products, nylon's combination of properties is finding increasing utility. Its toughness and flex life have contributed improved life and better troughing to conveyor belts when used with rayon. Its impact strength has made it outstanding for certain V-belt installations involving shock loads. Its strength and elasticity provide material-handling engineers with safe rubberized hoisting slings. Its resistance to abrasion and chemicals makes it well suited for the lining of hose used for conveying grains and chemicals. And its strength and flex life provide for excellent rubberized diaphragms.

Other nylon-reinforced rubber specialties are collapsible liquid storage tanks, fuel cells for military vehicles, pressurized radomes for radar equipment, Arctic troop shelters, pontoons, and footwear. Of rapidly growing importance for many protective covering and tarpaulin applications are nylon fabrics coated with neoprene. Here the strength and resistance to chemicals and microorganisms permit the use of much lighter tarpaulins that require less maintenance and give longer life.

Of the other non-cellulosic man-made fibers now in production, Dacron polyester fiber, another offspring of Carothers' work, appears to have the greatest potential in the rubber industry. Dacron's high strength combined with a high modulus, excellent flex life, good abrasion resistance, and dimensional stability makes it an outstanding candidate for use in belting and hose. Today it is rapidly expanding in the V-belt and fire hose markets and promises to find utility in flat belting and in other types of hose.

The remaining synthetics, such as Orlon[1] acrylic fiber, Acrilan[5] acrylic fiber, Dynel,[6] Saran,[7] and Fiberglas, have as yet found little or no use in the rubber industry.

As far reaching as the effects of Carothers' synthetic fiber research have been, the revolution he sparked may well lead to even greater changes tomorrow. With laboratories all over the world diligently searching for new fibers and with the technology essentially at hand to convert almost any material to filament form, we can look forward to an ever-increasing number of new and better fibers to replace or augment the fibers of today.

Historical Sketch of Textiles Other Than Cords for the Rubber Industry

H. S. Grew, Jr.
Wellington Sears Co., Inc.

Industrial textiles cover an extensive range of fabric and cord constructions made from both natural and man-made fibers. In the past the majority of fabrics has been applied for industrial purposes, but in recent years significant advances have been made in the engineering of textile materials to meet specific end-use requirements.

Boat sails made from flax and cotton ducks or canvas have been used for centuries, and they represent man's earliest attempts to apply fabrics for a particular industrial use. The steam engine, however, made the commercial sailing vessel obsolete, but an ever-increasing demand for cotton duck for other applications such as tentage, tarpaulins, and other protective coverings required greatly expanded facilities in this country for the manufacture of various types of heavy cotton fabrics.

The real start of industrial fabric manufacture coincided with the development of the vast automotive and rubber industries, which today account for the great bulk of industrial textiles. Pneumatic rubber tires required reinforcement, and the combination of cotton with rubber opened up great new outlets for textile materials. It was a comparatively simple matter for a cotton mill to adapt the heavy plied cotton yarns used in weaving canvas to the manufacture of the square-woven fabrics first used for tire reinforcement.

Later came the cotton tire cord constructions which were far better designed from an engineering standpoint. Recognizing the engineering aspects of cotton textiles for rubber reinforcement, the American Society for Testing Materials contributed early to industrial textile development by forming a special committee with representatives from both the rubber and the textile industries to develop standard textile specifications and test procedures.

Continuity of supply, as well as availability of raw material, is essential in industrial fabric manufacture, and these factors made it possible for cotton to take over the industrial market to a large extent. The advent of filament rayon, however, provided the textile industry with a new type of raw material for industrial fabric design which was economically feasible. With the subsequent development of high-tenacity filament rayon with its inherent advantages for tire reinforcement, the manufacture of cotton tire cords, which had constituted the largest industrial outlet for cotton, was doomed. Existing manufacturing facilities had to be converted to rayon cord production or other types of cotton fabrics.

High-tenacity rayon yarns designed primarily for tire cord constructions were adapted early for other types of woven textile reinforcement for rubberized products. Today these yarns are being used in ever-increasing volume in mechanical rubber goods as conveyor and transmission belting, hose of various types, and diaphragms.

The higher strength-weight ratio of high-tenacity filament rayon fabrics resulted in a trend toward lighter weight and thinner materials, necessitating many changes in equipment on the part of the cotton manufacturer. This change involved yarn preparatory machinery as well as modifications in weaving facilities. This trend, of course, was still further advanced by the development of filament nylon with its still higher strength-weight ratio advantage. Nylon, with its outstanding mechanical characteristics, is already well established, and its use is increasing in the tire field.

Through the advancement of manufacturing techniques, filament nylon is also being used in increasing volume for tarpaulins and many other protective coverings. Lightweight fabrics weighing in the neighborhood of 2½ and five ounces per square yard are neoprene-coated on both sides and are replacing cotton ducks weighing, before waterproofing treatment, 18 ounces per square yard. This trend again emphasizes the problems faced by the cotton duck manufacturer in converting production facilities over to the lighter-weight filament yarn constructions.

Now with the introduction of tubeless tires the cotton manufacturer again is faced with further modification of existing facilities and must consider as well the problems of heat-setting and predipping.

The emphasis, up to the present time, has largely been on filament yarn fabrics in the case of rayon and nylon; however, we must not lose sight of the fact that for certain applications factors other than tensile strength may require fabrics made from staple fiber yarns. Spun nylon fabrics are being used today for rubberized diaphragm and flexible tubing applications. Spun rayon sheetings and drills are being produced in increasing volume for vinyl and rubber coating, and applications are being found in the mechanical rubber goods field for staple rayon hose, belting and chafer constructions.

Economically these fabrics are attractive replacements for conventional cotton materials. A further advantage in their use is that they can be, in many instances, rubberized without the necessity of predipping. The spun yarn fabrics can be handled on conventional cotton machinery, and the problems of the cotton manufacturer in converting to these fabrics are not so great as in the case of lightweight multifilament and monofilament constructions.

Another textile development which has great significance is the manufacture of so-called non-woven materials, which is growing rapidly for industrial purposes. At present random fiber webs having approximately equal strength "around the clock" are being used largely for vinyl backing. Synthetic rubber and resins are utilized as fiber-bonding agents in the production of non-woven fabrics which are being produced on special machinery apart from regular textile operations.

Other man-made fibers, including Dacron, Orlon, Dynel, Fortisan, and Fiberglas, have found places in the industrial field, but only limited applications for rubber reinforcement at the present time. The chemical modification of cotton by acetylation and cyanoethylation is still very much in the development stage, and practical evaluation by the rubber industry has not as yet been attempted to any large extent. However, yarns and fabrics treated with acrylonitrile under the supervision of the Institute of Textile Technology are currently being prepared, and experimental yardages for evaluation will soon be available.

The many new man-made fibers have, of course, contributed greatly to the cotton manufacturer's problems. On the other hand, the availability of these fibers has given the textile technologists new building blocks with which to work on the development of new and improved industrial fabrics to meet end-use requirements. Through the continued cooperative efforts of the raw material producers and the textile manufacturers, even greater improvements in industrial fabrics can be made.

(To be concluded)

[5] ChemStrand Corp.
[6] Carbon & Carbide Chemical Co.
[7] Dow Chemical Co.

Seal for Custom Ovens

General Electric Co.'s plastics department, Decatur, Ill., is extruding a specially compounded silicone rubber seal for use in G-E's 1955 custom ovens, as well as in ranges made by other major manufacturers. Excessive heat losses and the escape of cooking odors are minimized by the use of these silicone oven-door seals, it was said.

Safety Congress, October 17-21, Rubber Section Program

The forty-third National Safety Congress & Exposition, to be held in Chicago, Ill., October 17-21, has scheduled symposia on plant medical programs and off-the-job safety during sessions devoted to the rubber industry, to take place at the La Salle Hotel. T. J. Cain, Jr., safety director, The B. F. Goodrich Co., and general chairman of the National Safety Council's Rubber Section, will preside at the general sessions.

Opening-day speakers will include Alexander N. Chapman, safety supervisor, Pratt & Whitney Aircraft Division, United Aircraft Corp., who will discuss medical programs in large plants; Maxwell C. Weaver, president, Randall Co., who will expound the view that small plants can benefit from complete medical programs; and Arthur R. Pomeroy, safety director, Ohio Rubber Co., who will deal with the rubber industry's injury statistics.

Also slated for October 17 is a symposium on off-the-job safety, which will consider the industrial and community aspects of accidents that occur to workmen away from the plant. Speakers will be C. B. Patterson, safety and fire protection engineer, E. I. du Pont de Nemours & Co., Inc., and Tom Horner, editorial writer for the *Akron Beacon Journal*.

Five round-table discussions on specific safety problems will highlight the October 18 session. The subjects and the presiding moderators consist of the following: "Guarding Mills and Calenders," N. C. Longee, safety supervisor, Passaic plant, United States Rubber Co.; "Safe Handling of Flammable Liquids," George H. Burkhardt, safety and plant protection manager, The General Tire & Rubber Co.; "Supervisory Training," Glen D. Cross, director of safety and supervisory training, The Firestone Tire & Rubber Co.; "Control of Hazardous Chemicals," Frederick W. Sands, industrial hygienist, U. S. Rubber; and "Safety in In-Plant Trucking Operations," R. W. Fickes, assistant safety director, The Goodyear Tire & Rubber Co.

The safety conclave's exhibition, to be held at the Conrad Hilton Hotel, will consist of 256 booths devoted to the display of products, equipment, and services relating to the promotion of safety, health, first-aid, sanitation, and general welfare in industry. Educational displays are being sponsored by such organizations as the National Bureau of Standards, Underwriters Laboratories, the American Medical Association, and the National Society for the Prevention of Blindness.

Macromolecular Symposium Slated for Israel, April 3-9

An International Symposium on Macromolecular Chemistry will be held in Israel, April 3-9, 1956, under the joint auspices of the Commission on Macromolecules of the International Union of Pure & Applied Chemistry and The Weizmann Institute of Science, Rehovot, Israel.

The major portion of the sessions will be conducted at the Institute, with other meetings scheduled for the Hebrew University, Jerusalem, and the Israel Institute of Technology, Haifa. The program also includes a reception by the Government of Israel, conducted tours of Biblical sites, and a special slate of tours and activities for the wives of attending scientists.

The symposium will be divided into three major approaches to the subject: general behavior of polymers in solution, including statistics and thermodynamics of polymer solutions, molecular weight and molecular shape, and hydrodynamic properties; general behavior of biocolloids and polyelectrolytes in aqueous solution, including colligative and flow properties, electrochemistry of polyelectrolytes, colloidal and surface phenomena in biocolloids and polyelectrolytes, and interaction of charged macromolecules; and special polymeric systems in solution, including organic polymers, inorganic polymers, biological polymers, and synthetic polyelectrolytes.

The official languages of the symposium will be English and French. The American Express will act as the official travel agency of the conclave. Air transportation is expected to be offered at reduced rates.

Further details of the event, including applications, information on travel and hotel accommodations, and the submission of papers to be read, may be obtained from Mrs. Violet C. Rycus, International Symposium on Macromolecular Chemistry, The Weizmann Institute of Science, Rehovot, Israel.

Groups Enjoy Outings

SORG Report

The Southern Ohio Rubber Group held its annual summer outing at the Inland Activities Center, Dayton, O., June 4, with 132 members in attendance. Of the 26 golf awards distributed, James Wall, Inland Mfg. Division, General Motors Corp. won first prize. Thirteen awards to outdoor games winners were also distributed, and more than 75 door prizes were given to members.

J. G. Sommer, Jr., Dayton Rubber Co., was chairman of the arrangements committee and was assisted by Harold Schweller, Inland Mfg. Other committee members included Marshall Mazer, and Byron Nelson, both of National Cash Register Co.; John G. McCloskey, Joseph Szaruga, John Whiteside, James Wall, and Frank Ekberg, all of Inland Mfg.; and Dick Hempelman, and Raymond Jacobs, both Premier Rubber Co.

Also James Hoerbelt, Tom Dillard, Norman Wissinger, Louis Keyes, and Robert Bennet, all of Dayton Rubber; Roy Marston and Richard Loges, both of Binney & Smith; and Jerry Kelble, Wright-Patterson AFB.

New York Group Tees Off

The New York Rubber Group conducted its annual golf tournament at the Shackamaxon Golf Club, Scotch Plains, N. J., July 28, with 149 members and guests participating and 186 attending the dinner that followed. Vincent Lake, Asphaltic Specialties Co., with a 73, won the low gross event for the third successive year, retiring the Nesbit Cup. Tied for second with 77's were F. Waznak, Irvington Varnish Co., and W. C. Curtis, Naugatuck Chemical.

Russ Shaw, Lee Tire & Rubber Co., won the low gross for guests contest, with Frank Pechal, Manhattan Rubber Division, second. O. B. Samler, R. T. Vanderbilt Co., with a 134, had little opposition for high gross winner.

Golf committee for the day consisted of G. H. Provost, United States Rubber Co.; H. Due, St. Joseph Lead Co.; J. Breckley, National Lead Co.; and C. O. Davison, Binney & Smith Co.

Wire, Cable Symposium

The fourth annual Technical Progress in Communication Wires and Cables Symposium, sponsored jointly by the Signal Corps Engineering Laboratories, Fort Monmouth, N. J., and the wire and cable industry, will be held at the Berkeley-Carteret Hotel, Asbury Park, N. J., December 6-8.

Subjects to be covered include wire and cable constructions, their characteristics and uses, conducting, insulating, and jacketing materials, manufacturing equipment, processes, and techniques, field construction practices, and the end-uses in operating systems.

Details on the conference may be obtained from H. L. Kitts, chairman or H. F. X. Kingsley, committee member, by writing to Signal Corps Headquarters or telephoning Eatontown 3-1000, Extensions 51565 or 51564.

Spectrometry Conference

The sixth Divisional Conference of the Analytical Chemistry Division, The Chemical Institute of Canada, has been scheduled for the Guildwood Inn Motel, Sarnia, Ont., Canada, November 14 and 15, 1955. "Mass, Infrared, Ultra-Violet, Visible, and Flame Spectrometry" is the theme of the conclave. A. A. Sheppard, Imperial Oil, Ltd., Sarnia, invites communications from prospective authors of papers.

Monsanto Chemical Co., St. Louis, Mo., is the sole chemical exhibitor at California's new Disneyland, where it is displaying a "Chemitron," a symbolization of the eight basic raw materials of chemical manufacture—salt, sulfur, oil, coal, air, phosphate rock, limestone, and water.

NEWS of the MONTH

Washington Report and National News Summary

The booming rubber industry continued to have its ups and downs in August, with news of record production, present and future, counteracted by production losses in the northeastern section of the country due to disastrous flash floods.

Major developments of the month were as follows:

. . . The Disposal Commission sold 447 pressure tank cars to three companies for $2,279,700 and received authorization to open bidding again for sale of the Institute, W. Va., GR-S plant.

. . . Office of Defense Mobilization replies to John L. Collyer, B. F. Goodrich chairman, and Thomas A. Robins, Jr., Hewitt-Robins president, letters on natural rubber stockpile reduction emphasized that action depends on the Defense Department report on military tire requirements.

. . . Mechanical rubber goods 1955 record sales of $1.2 billion were predicted by G. A. Lovell, vice president, United States Rubber Co.

. . . Federal Trade Commission quantity-limit rule decision on replacement tires is due September 7-8; Robinson-Patman Act criticism may cause repeal of this rule.

. . . Flash floods in northeastern section of the country on August 19 damaged rubber and supplier plants in this area and may curtail production for several weeks in some instances.

. . . Record rubber consumption spurs extension plans for synthetic rubber as Firestone and Goodyear announce plans.

. . . Commerce Department reports rubber industry plants increased from 834 in 1946 to 1,196 in 1953, with biggest percentage increases in plants employing less than 100 persons.

Washington Report

By ARTHUR J. KRAFT

Disposal Commission Sells Tank Cars; Opens Bidding on Institute Plant

The Rubber Producing Facilities Disposal Commission announced August 18 the sale of 447 pressure tank cars for $2,279,700 cash, or $5,100 per car. The amount realized from the sale is only $25.86 per car less than their original cost to the government during the early part of World War II. All of the cars are of the 50-ton class; each has a carrying capacity of about 11,500 gallons.

The three companies who purchased the cars were Union Tank Car Co., Chicago, Ill., 225 cars; General American Transportation Corp., also of Chicago, 172 cars; and Vendome Tank Car Co., Tulsa, Okla., 50 cars.

Second Sales Attempt Succeeds

According to reliable, but unverified reports, when the cars were offered for sale two years ago, they drew one substantial bid from one of the three firms which ultimately bought part of the fleet last month. The bid for the entire fleet was at the same price $5,100 per car. The Attorney General, however, under powers conferred by the Disposal Act, stepped in to block the deal as inconsistent with the anti-trust laws, and the Commission was forced to indicate "no sale" when it reported to Congress in January, 1955.

When the cars were offered for sale again last spring, under the bill authorizing a second try at selling the Baytown GR-S plant, 11 companies submitted purchase proposals for from 10 cars to the entire fleet. The Commission set the $5,100 per car offer it had two years ago as its asking price. After months of bargaining, three of the bidders met that price. All sales were approved by the Attorney General, the Commission announced. Congressional approval is not required.

Institute Bidding Opens

The Disposal Commission also announced in August that the 60-day period for receiving proposals to purchase the GR-S plant at Institute, W. Va., would end on October 7, 1955.

Under the provisions of Public Law 336, 84th Congress, First Session, when the President signed this legislation authorizing extension of negotiations for the sale of the Institute plant on August 9, the 60-day period began with the date of the President's approval.

Descriptive brochures of the plant are available to qualified purchasers on application to the Commission in Washington, D. C., and official advertisements inviting proposals appeared in a number of newspapers throughout the country beginning August 22.

Under Public Law 336, the Commission will negotiate for a period of not more

than 75 days on the proposals received. Within 10 days after Congress reconvenes next January, the Commission must report to Congress, which in turn has 30 days to review the recommendations. The law also provides that the Attorney General must pass on the recommendations from the standpoint of the anti-trust laws.

The Institute plant is the largest of the government-built GR-S plants, with an assigned annual capacity of 122,000 long tons a year. It has been in standby since September, 1953. No bids were received for the plant in the original negotiations of the Commission, but in the recent past Carbide & Carbon Chemicals Corp. showed interest in the plant for non-rubber uses, and when this interest was discouraged, Imperial Commodities Corp. and others developed an interest in this plant. (See RUBBER WORLD, August, 1955, page 630.)

ODM Says Stockpile Cut Awaits Defense Dept. Report

Defense Mobilizer Arthur Flemming in August made public what were then already weeks-old replies to the appeals of two rubber companies for a reduction in the natural rubber stockpile "objective" and sale of the resulting surplus.

The ODM replies contained little not previously known. Signed for Mr. Flemming by the agency's Assistant Director for Materials, W. S. Floyd, they noted that—

(1) A review of the stockpile objective has been under way for some time, about a year, but has been delayed because the Pentagon has not yet furnished ODM with up-to-date military tire requirements due back in February.

(2) Should these requirements and other considerations justify a reduction in the stockpile, Congressional policy, as spelled out in the Stockpiling Act (Public Law 520, Seventy-Ninth Congress), imposes rigid standards for disposal of stockpiled materials which would take many months to meet.

Defense Department Report by Fall

The only "news" in these letters was the strong implication that military tire requirements have altered greatly since the rubber stockpile goal was last reviewed, and the emphasis, cheering to the natural rubber producing trade, on doing nothing to upset the apple cart in tinkering with the stockpile. The ODM letters also set "early fall" for likely submission of the military's data, with completion of the review "shortly thereafter."

Completion of the review, Mr. Floyd said in replying to a mid-July letter from Thomas A. Robins, Jr., president, Hewitt-Robins, Inc., "has been delayed by changes in military programs of such nature as to considerably affect military tire requirements which, in turn, would have a very substantial bearing on the size of the natural rubber stockpile objective."

This statement *seems* to say that the size of the stockpile objective is likely to change as a result of revised military programs. However it doesn't quite say it, and Mr. Floyd was careful to note this in replying to his other rubber industry executive, B. F. Goodrich Chairman John L. Collyer, who had written to ODM on stockpile matters several times in recent years.

"The validity of that complete review of the rubber stockpile program which you and we agree is called for," Mr. Floyd wrote in response to Mr. Collyer's missive of June 29, "obviously depends in large part on submission by the military of estimates for military tire requirements firmly based on revised military programs. . . . We greatly regret this delay (in receiving the estimates), but feel sure that we cannot properly anticipate the outcome of the review and take steps affecting the size of the stockpile now—out of a feeling that world crude rubber prices may be too high."

Mr. Collyer had offered the opinion that improvements in the adaptability of synthetics to military requirements could justify, without endangering military strength, a reduction to about 900,000 tons in our natural rubber stockpile. The present objective, fully met in the past year, is a stockpile on the order of 1.3 million tons. Mr. Robins offered a similar argument in asking for release of about 15% of the present stockpile.

In its separate replies to both industry executives, ODM made quite a point of the legal hurdles that the government must contend with before it could sell stockpiled rubber, assuming that the new review warrants any reduction in the present objective. Mr. Robins was read the entire disposal section of the Stockpiling Act; while Mr. Collyer was informed that the government "increasingly seeks to manage (its huge stockpile stocks) with a minimum of influence on prices, one way or the other."

Reaction Moderate

Reaction to the exchange of letters was moderate. The Singapore market firmed up at what it regarded as a rather bullish note sounded by the ODM, but prices remained principally affected by other day-to-day market factors, notably the still heavy volume of orders and tight supplies.

The Natural Rubber Bureau here, speaking for Malayan planters, only a few days earlier had issued a public pronouncement deploring present high natural rubber prices, but emphatically denying that they were due to anything save the economic factor of tremendous demand, with which producers were finding it hard to keep pace. The Bureau also denounced suggestions that the stockpile be used as an instrument for knocking down the market, with appropriate reference to the statute books.

There were reports, too, that Mr. Collyer and Mr. Robins were expressing hopes shared by few other American rubber companies. The other "majors" of the industry, it was said, feel quite strongly that the stockpile should not be reduced, particularly in view of steadily rising rubber consumption in this country. Several of these firms own natural rubber plantations overseas and have been sharing, to some degree, in the larger profits resulting from the upward thrust of the market. Neither Goodrich nor Hewitt-Robins has such plantations in production today.

NSF Rubber Research Group Named

The National Science Foundation last month named a special 11-member commission to develop recommendations on the future role of the federal government in basic research on synthetic rubber. The commission, composed of six scientists and five non-scientists, was established at the suggestion of the Rubber Producing Facilities Disposal Commission, which conducted the sale of the government-owned synthetic rubber plants to private industry.

The research program, a part of the government's operation of the synthetic rubber industry from its inception in 1942 to this past spring, was extended until next June 30, pending a decision by Congress on what sort of role the government should play, if any, with the plants now in private hands.

NSF Director Alan T. Waterman, in announcing formation of the study commission, said he is hopeful that it will have definite proposals in shape in time for NSF to place a legislative program before Congress in January.

The government synthetic rubber research program, including operation of the $2.2 million Akron testing laboratory and pilot plant, was budgeted for $4,160,000 in the past fiscal year. Total federal expenditures since 1942 were in the order of $30 million.

An informal discussion of the future of government research sponsored by the Chemical Engineers Club of Washington several months ago revealed sharp differences of view, with rubber company executives lining up for a narrow circumscribed program. The industry view, judging by the sentiments expressed at that time, is that private firms can be relied upon to develop the new rubbers and products required by the military establishment.

NSF will ask the study commission to consider several proposals on the future of the Akron labs, such as selling or leasing to private industry or to a university or some other non-profit institution, as well as retention and operation by the government. The 11-member commission, which will name its own chairman and vice chairman, was announced as follows:

Scientists—Arthur C. Cope, department of chemistry, Massachusetts Institute of Technology; Farrington Daniels, department of chemistry, University of Wisconsin; Joseph C. Elgin, school of engineering, Princeton University; Paul D. Foote, Gulf Research & Development Co.; Edwin R. Gilliland, professor of chemical engineering, MIT; and Warren C. Johnson, division of physical sciences, University of Chicago.

Others—William H. Davis, of Davis, Hoxie & Faithfull; Frank A. Howard, Standard Oil Development Co.; David D. Henry, New York University; Lawrence A. Kimpton, University of Chicago; and William A. Krebs, Jr., MIT.

Mechanical Goods $1.2 Billion 1955 Sales

Sales of industrial rubber goods this year will top 1954's volume by 12% and may go even higher next year, G. A. Lovell, vice president and general manager of the mechanical goods division, United States Rubber Co., told a divisional sales meeting in Washington, D. C., in August. He is predicting a 1955 sales total of $1,200,000,000, compared to the 1954 total of $1,060,000,000 and the 1953 record of $1,187,000,000.

"Based on the current business outlook for next year, production of industrial rubber goods should continue at a very high level," Mr. Lovell remarked, "with a further increase over 1955 a distinct possibility."

The estimated volume for 1955, he said, is made up of $220,000,000 for molded and extruded goods; $210,000,000 for hose: $200,000,000 for fuel cells and hard rubber items, $160,000,000 for belts and belting; $150,000,000 for foam sponge products; and $260,000,000 for a miscellaneous group, which includes the following: mats and matting, $45,000,000; packing, $35,000,000; tank linings, $25,000,000; tapes, $20,000,000; flooring, $20,000,000; roll coverings, other than printer rolls, $15,000,000; tubing (not-reinforced), $10,000,000; printers rolls, $5,000,000; and other mechanical goods, $85,000,000.

Rising population and living standards, new products consuming rubber in large volume, growth possibilities in plastics products such as pipe and ducts, and further growth in the automobile industry were cited by Mr. Lovell as factors contributing to the rise. He noted that more than 350 non-tire rubber parts go into the modern automobile.

Rubber goods manufacturers are expected to reap total sales of $5,250,000,000 this year, despite a 50% cutback in defense orders from the 1953 peak, the U. S. Rubber executive noted. New rubber consumption, he estimated, will run to about 1,480,000 long tons, an increase of 20% from the 1954 figure and of 11% from the 1953 all-time high.

Quantity-Limit Rule Decision September 7-8; Robinson Patman Act Criticisms May Eliminate Rule

The Federal Trade Commission's quantity-limit rule on replacement tires and tubes is again embroiled in controversy. The rule, barring additional discounts for manufacturer shipments to dealers, larger than a single 20,000-pound carload, was issued four years ago. For just as long the Commission has been frustrated in its efforts to invoke the rule because of temporary restraining orders issued by the courts in response to injunction suits filed by nearly a score of tire manufacturers.

Tire Companies Suit Decision, September 7-8

The latest move in a series of preliminary actions came a few months ago when the government filed a motion in federal district court here for a summary judgment throwing out the tire company suits so that the ruling can take effect. District Judge Alexander Holtzoff set September 7-8 for arguments on this motion. Regardless of how he rules, the case is almost certain to be appealed to higher courts and eventually may wind up in the Supreme Court.

Robinson-Patman Act Criticisms

That, at least, is the prospect if Congress doesn't move into the picture first and act on suggestions by some anti-trust experts that the quantity-limit proviso of the Robinson-Patman anti-price discrimination law, the legal underpinning for the tire limit rule, be repealed. Such proposal has come from the 60-member commission which studied revision of the anti-trust laws for the Attorney General during the past year. Its recommendations, many of them controversial, are expected at least in part to find their way into legislative proposals which the Justice Department is preparing for submission to Congress next year.

A similar study of the need of revision of anti-trust policy has been undertaken by the Senate Judiciary anti-trust subcommittee under Sen. Harley Kilgore (Dem., W. Va.). The quantity-limit proviso came in for much discussion by experts called upon for testimony before the subcommittee in late August and early September. Here are some of the arguments presented by opening-day witnesses:

Jesse W. Markham, Associate Professor of Economics, Princeton, economic consultant to the Federal Trade Commission, and director of FTC's Bureau of Economic Research last year: "The quantity limits proviso should ultimately be repealed," but not before the courts rule on the tire company case now before them. The proviso authorized FTC to "fix and establish quantity limits . . . . when it finds that available purchasers in greater quantities are so few as to render differentials on account thereof unjustly discriminatory."

FTC has invoked this power only once in the two decades that it has been on the books, using it to limit discounts granted on replacement tires and tubes for automobiles.

"But the particular condition under which it was invoked," said Mr. Markham, "is sufficient evidence that this power could be used to prevent many price differences that reflect cost differences. In the rubber tire and tube case it was invoked because 'only' 63 buyers accounting for 29% of the market purchased in carload quantities. This extreme interpretation of 'so few' is broad enough to be applied to virtually the entire economy."

Richard Heflebower, chairman, economics division, Northwestern University: "I doubt whether a quantity-limit rule in any form was called for in the tire industry, particularly since the situation that gave rise to the demand for its imposition reflected a structural change in the sale and distribution of tires for replacement purposes which did not bring about a substantial reduction of competition, but rather an augmenting of it."

He centered his objection on the failure of the FTC rule to differentiate between a manufacturer's own brand of tires and the private brand he makes and ships to large chain distributors, farm "co-ops," and oil companies. The manufacturer cannot give a lower price to these buyers than he quotes on a carload shipment of his own advertised brand, despite the fact that "the manufacturer has engaged in expensive selling and advertising program for his own brand and has developed a dealer organization, both of which costs are bypassed to a considerable degree in private-brand selling by large retail organizations."

By making both types of brands subject to the quantity-limit rule, he charged, the FTC has imposed a "control over competition and pricing which is designed to inhibit a structural change in the way in which products are produced and distributed" even though competition has been increased through this change.

"The Commission's order indicates a lack of understanding of the focal point of competition in this industry, or a disregarding of that knowledge. The key source of competition," Mr. Heflebower declared, "is the conflict of interest between the manufacturers who distribute their own well-known brands and the large distributive organizations" who buy private-brand tires and sell them at lower prices made possible by one-step distribution and minimal sales expense. This practice gives the consumer alternatives that act as "a powerful restraint on what manufacturers and their dealers" can charge for their factory brands.

Joel B. Dirlam, associate economics professor at Connecticut University, predicted that the FTC quantity-limit rule "can only lead to complete integration by the mail-order houses, and perhaps the auto supply stores and oil companies as well, with competition continuing unabated, and perhaps intensified."

Sears, Roebuck, he noted, already has partial ownership of tire factories, producing to its order on specification.

"The Robinson-Patman Act," said Dirlam, "has failed to bring a halt to mail-order and auto accessory store offerings of tires at less than the nominal retail price for house-brand 100 level tires." He approved of the quantity-limit rule, although conceding the FTC was "weak in its economic underpinning. It seems absurd," he said, "to say that 63 buyers can tend to monopolize anything."

NBS Bill Passes Senate

In an editorial in the August issue we urged rubber industry management to support Senate bill S. 2060 and House bill H. R. 6381, which were amendments to the Organic Act of the National Bureau of Standards of March 3, 1901, and would provide authority for the use of a working capital fund and permit other improvements in fiscal practices.

RUBBER WORLD was concerned principally with the fact that these amendments

would permit the Bureau of Standards to finance adequately the standard sample program for the rubber industry which includes standard samples of natural and synthetic rubbers and major compounding ingredients.

After our August issue went to press and during the closing days of the last session of Congress, the Senate bill S. 2060 was passed. The House bill was not passed, but the House Interstate and Foreign Commerce Committee now has the choice of two bills since S. 2060 was referred to it.

Passage of amendments to the Bureau of Standards Act is therefore half completed, and the House should act on this measure early in the next session of Congress, which begins January 3, 1956. Support of this important bill is still urged, and industry management should address its remarks to the House Interstate and Foreign Commerce Committee in order that passage early in the next session of Congress is accomplished.

National News

New England Flood Damage Production Losses

The disastrous flash floods, which struck certain sections of the northeastern section of the country, August 19, resulted in considerable property damage to rubber industry plants in these areas and will mean production and profit losses for some companies. The accompanying map from the *New York Herald Tribune* of August 21 shows the areas affected by the floods, with the diagonal shading locating the worst damage.

Damage in the Naugatuck and Connecticut River valleys was quite severe, as was damage in the Delaware River valley in Pennsylvania. The areas around Worcester and Springfield, Mass., were also hard hit, and just over the state line in Rhode Island, United States Rubber Co. suffered damage to its Woonsocket, R. I., plant.

U. S. Rubber

U. S. Rubber is making every possible effort to get its five flood-damaged plants in Connecticut, Rhode Island, and Massachusetts back into full production, H. Gordon Smith, executive vice president, said on August 22.

The company's personnel at each plant already have recovery and repair work well under way. Engineering, production, and safety personnel from New York and other locations have been rushed to Naugatuck, Conn., and Woonsocket, the areas hardest hit by the floods, to help restore employment and service to customers, it was said.

Truckloads of steam, water, and fire hose from the company's mechanical goods plants in Passaic, N. J., and electrical wire and cable from its Bristol, R. I., wire plant are being rushed to the stricken plants to help restore power and rectify the damage, it was added. The company expects to make up for part of the loss of production in the plants hit by the flood through production increases in other similar plants in other sections of the country.

"It will not be possible," Mr. Smith said, "to obtain an accurate estimate of the cost of the flood for several days and possibly weeks. However, it now appears that total damage to the five plants may run as high as $5-10 million. The plants were not covered by flood insurance because it is extremely costly and nearly impossible to obtain."

A summary of the damage to the plants and an estimate as to when they can be placed back into operation was supplied as follows:

FOOTWEAR PLANT, NAUGATUCK, CONN. Damage severe, with payroll records lost, and many mills, Banbury mixers, and calenders out of operation. Will start shipping footwear products to customers from warehouse on August 29. Expect to resume some production in two weeks and full production in six weeks.

CHEMICAL PLANT, NAUGATUCK, CONN. Damage severe, principally to inventories of raw materials and finished goods. Production facilities for reclaim rubber hardest hit. The rest of the plant expects to resume production when power is restored, possibly as soon as August 29.

SYNTHETIC RUBBER PLANT, NAUGATUCK, CONN. Damage slight. Full operation is expected as soon as power is restored or by August 27.

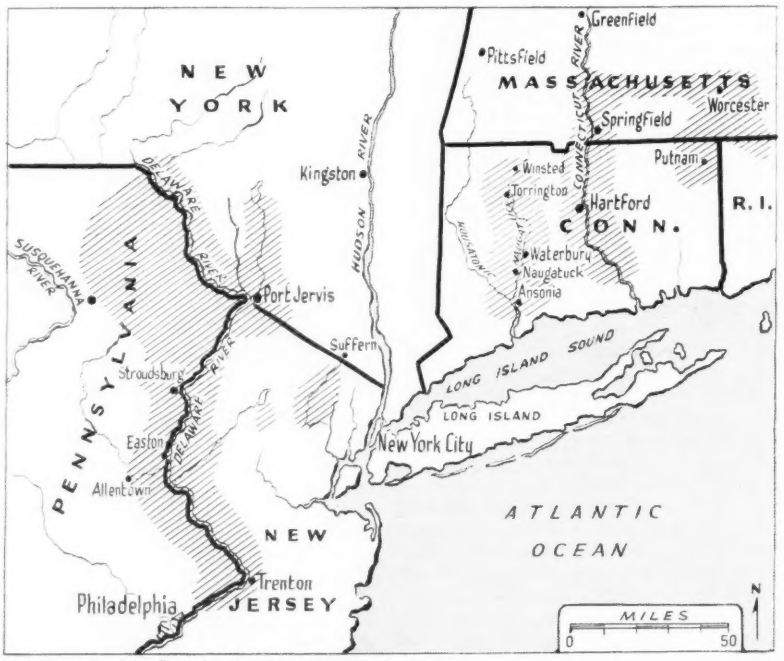
FOOTWEAR AND FOAM RUBBER PLANT, WOONSOCKET, R. I. Damage moderate. Expect to start shipments to customers on August 24. Partial production is expected to start in two weeks, and full production in three or four weeks.

TIRE PLANT, CHICOPEE FALLS, MASS. Damage slight, with interruption of power the principal problem. Plant will begin curing tires on August 22.

Sponge Rubber Products Division

The plants of the Sponge Rubber Products Division, The B. F. Goodrich Co., in Shelton and Derby, Conn., had moderate damage, according to Earl Gunn of that company. All of the four plants were closed down on August 19, as a result of the flood, which affected the various plants differently. It was said, however, that power was expected by August 26, and that the plants should be back in production by August 29.

Damage to the amount of about $250,000 was reported. As soon as light as well as power is available, the company will be able to estimate damage to stocks and indicate when shipments to customers will be resumed on a normal basis.



Map drawn by John Fleck for the "New York Herald Tribune"

New England Flooded Areas, with Diagonal Shading Indicating Communities Hardest Hit

This company said that because it had some advance warning it was able to remove some equipment to a safe place before the full force of the flood struck.

Farrel-Birmingham

Farrel-Birmingham Co., Inc., Ansonia, Conn., supplier of mills, Banbury mixers, tubing machines, presses, and other machinery to the rubber and plastics industries, had considerable damage due to flood water in its mill and erector shops, but its machine shop was not flooded. According to Donald Comes, vice president and general sales manager of the company, auxiliary power units had been brought in, and the plant was making good progress toward getting back in production during the week of August 22.

Mr. Comes said that all urgent customer orders were being taken care of at the Buffalo and Rochester, N. Y., plants of the company, and that although some delays might be experienced, they would be minimized because of the available facilities of the two above-mentioned plants.

Farrel-Birmingham had offered its assistance to rubber and other companies in the Naugatuck Valley area and was actively cooperating with the Naugatuck Chemical Division, U. S. Rubber, in getting that company's mills, mixers, and other rubber processing equipment back in operation again.

It was not possible to determine the extent of damage, if any, to other rubber plants and supplier plants in the Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, and Massachusetts areas as RUBBER WORLD went to press.

Record Rubber Use Spurs Synthetic Expansion Plans

Record consumption of new rubber during the first half of this year at about 772,000 long tons will probably not be continued in the second half, according to J. P. Seiberling, president, Seiberling Rubber Co. Firestone Tire & Rubber Co. and Goodyear Tire & Rubber Co., however, have announced plans to increase the productive capacity of the GR-S type rubber plants, Firestone from 100,000 to 150,000 long tons a year, and Goodyear from 137,500 to 200,000 long tons a year.

Seiberling referred to the International Rubber Study Group estimates which state that the United States will use a record 1,400,000 long tons of new rubber this year, but said that since 772,000 tons were used in the first half, the use of new rubber in the second half would be about 682,000 tons. About 57%, or 441,000 tons of the new rubber used in the first half of 1955, was synthetic rubber, and 43%, or 331,000 tons, was natural rubber. He added that the second-half synthetic rubber percentage would probably rise to 60%, and the fall in natural rubber usage could amount to as much as 80,000 long tons, or 23%.

"Private ownership of synthetic rubber producing facilities, continuing quality and uniformity improvements in synthetic rubbers, and the unjustified high speculative prices of natural rubber all combine to establish United States synthetic rubber consumption on a permanently high level," he declared.

Burt on High GR-S Type Production

Early in August, William I. Burt, president, Goodrich-Gulf Chemicals, Inc., which owns and operates one-half of the former GR-S plant at Port Neches, Tex., called attention to the fact that the United States synthetic rubber producing industry, in the first two months of private ownership (May and June, 1955) turned out 130,700 long tons of GR-S, in spite of the fact that the Institute, W. Va., GR-S plant was idle in standby. The only two-month period with higher production was during April and May of 1953, when the Institute plant was in full operation.

"Of America's total new rubber needs, 60% is being supplied by synthetic rubbers, and only 40% by natural rubber, and additions to production capacity now under way, or planned at the synthetic rubber plants, will assure American, as well as foreign, rubber products manufacturers of ample supplies of constantly improved rubber," Burt added.

Firestone Expansion

A substantial increase in production of synthetic rubber in the last half of the year is seen by Harvey S. Firestone, Jr., chairman, Firestone Tire & Rubber Co. He added that the Firestone Lake Charles, La., GR-S type rubber plant will produce 30% more during this period than during the first half.

Expansion under way at Lakes Charles will enable the plant to produce at the rate of 150,000 tons of Butaprene S annually, an increase of 50% above its rated capacity when purchased from the government in April. In July, output from this plant was at the rate of 123,000 tons a year, owing to expansions already completed.

Firestone said that during recent months a strong demand has developed abroad for American produced synthetic rubber as foreign tire manufacturers recognize the quality advantages of general-purpose butadiene/styrene copolymers and the fact that GR-S type rubber enables them to be more independent of Far Eastern sources of natural rubber than they have been in the past.

Goodyear Expansion

Meanwhile P. W. Litchfield, chairman, Goodyear Tire & Rubber Co., announced that the Houston, Tex., GR-S plant acquired from the government will be enlarged in two stages which will ultimately provide a 50% increase in capacity, that is, from 137,500 tons annual rate to 170,000 tons and then to 200,000 tons. The first stage of the expansion is expected to be completed in early 1957, at a time when forecasts indicate the growing world demand for raw rubber will be approaching the statistical capacity limits of existing rubber plantations and synthetic rubber plants, it was said.

In providing the first additional 25% capacity increase, underground and other construction work will be done to take care of a future production line of equal size and capacity so that ultimately the capacity of the plant will be in excess of 200,000 long tons a year.

Cost of the initial expansion stage is estimated by Goodyear at slightly under $6 million.

Tire Prices Increased; June Record Production Month

The prices of most pneumatic passenger, truck, farm, and industrial tires was increased at least 3¼% early in August by tire manufacturing firms. Industrial solid tires and inner tube prices were increased 6%.

Increased costs for natural rubber and other raw materials as well as increased labor costs were the reasons given for these price increases.

At about the same time price increases of 5% to 10% were announced for foam rubber products. The 10% increase was applied to furniture and bedding items, made mostly from natural rubber, and the 5% increase to sheet stock and foam rubber slabs, which use larger proportions of lower-cost synthetic rubber.

The Rubber Manufacturers Association, Inc., announced in its regular monthly report the production of passenger-car tires during June amounted to 9,383,439 units and established a new all-time record month and an increase of 7.3% from May, when 8,741,580 passenger tires were produced, and 6.5% above the previous production peak of 8,810,010 units made in March, 1955.

Manufacturers' shipments of passenger-car tires continued at record-breaking levels during June, when 8,978,829 tires were shipped.

Production of truck and bus tires amounted to 1,319,596 units, an increase of 9.3% in June over the 1,207,822 units produced in May. Shipments in June totaled 1,255,046 tires, an increase of 4.4% over the 1,201,795 shipped in May.

Commerce Reports on 1946-1953 Industry Growth

The United States Department of Commerce in its monthly publication, "Chemical and Rubber," for July reported on the growth of the rubber goods manufacturing industry from 1946 through 1953. The information was obtained from reports made by employers whose workers are covered by the provisions of the old-age and survivors insurance program. The reports were made on a "number of establishments" basis, which means in the case of multi-plant companies, each separate plant is counted as an establishment.

The table below gives the results from the Commerce Department report which was presented for plants with various numbers of employes as well as for the total.

NUMBER OF ESTABLISHMENTS IN RUBBER PRODUCTS INDUSTRIES, BY SIZE OF EMPLOYMENT FOR SELECTED YEARS, 1946-53

Size of Employment*	Number of Establishments by Year†						
	1946	1947	1948	1949	1950	1951	1953
0-3‡	n.a.	174	185	204	158	172	194
4-7	n.a.	105	117	118	142	131	145
8-19	n.a.	146	183	210	177	196	205
0-19‡	357	425	485	532	477	499	544
20-49	141	149	136	148	163	170	200
50-99	83	94	88	113	119	133	129
100-249	n.a.	n.a.	n.a.	n.a.	110	111	133
250-499	n.a.	n.a.	n.a.	n.a.	58	76	77
100-499	152	157	170	162	168	187	210
500 or more	101	107	112	105	103	112	113
Total	834	932	991	1060	1030	1101	1196

* Employment size of reporting unit is measured as of mid-March pay period.
† Data for 1952 and 1954 are not available.
‡ The employment size "O," included in size group "O-3" and "O-19," refers to reporting units which did not have any employes in the mid-March pay period, although they had at least one employe at some time during the first quarter.

In commenting on the above figures, the Commerce Department pointed out that except for a small decline in 1950, the total number of rubber goods manufacturing plants has steadily increased to a level of almost 1,200 units in 1953. This figure represents an advance of 28% over that of 1947, nearly three times greater, proportionately, than the advance shown for all manufacturing industries combined.

A healthy net growth is shown in the number of rubber plants for each of the employment size categories, it was added. From 1947 to 1953, plants with less than 50 employes had a net increase of 170 units, an advance of 30%, as compared with a rise of 94 establishment, or 26% for plants with 50 or more employes. Even the number of smaller plants, having less than 20 employes, advanced 28%, indicating many opportunities in the rubber products field for small-scale operation, often the result of new ideas, new uses, and technical improvements. Rubber products plants with 100 or more employes in 1953 advanced 22% over the 1947 level.

Nearly half of the rubber manufacturing plants had less than 20 employes and almost two-thirds had less than 50 employes in 1953. About one-fourth of the plants had 100 or more employes. Approximately this same distribution of rubber goods plants existed over the entire 1946-53 period. Although the plants with less than 50 employes accounted for only about 3% of the total rubber manufacturing employment, their service and importance to the industry were of far greater value, the Commerce Department said.

New Labor Contracts at General Tire; Firestone Wage Talks Begin

A new five-year labor contract covering pensions, insurance, and hospitalization for 5,000 employes at The General Tire & Rubber Co. plants in Akron, O., and Waco, Tex., was signed in Akron, August 3, between the company and the United Rubber Workers, CIO, union.

Representatives of the Firestone Tire & Rubber Co. and the URWA began talks in Cleveland, O., on August 9, on the request of the union for a "substantial" wage increase and a guaranteed annual wage. The company is expected to answer that the guaranteed annual wage cannot be discussed at this time because the existing contract may be reopened only on the general wage increase question.

The local URWA unions of the Firestone company took a vote in mid-August with the result that the union was given the authority by its members to strike against the Firestone plants any time up to the expiration of the existing contract on August 28, if a favorable wage settlement was not reached by that time.

Negotiations between The B. F. Goodrich Co. and the URWA union on the wage issue were scheduled to begin in New York on August 23, and between General Tire and the union during August also.

N. Y. Rubber Group Course on Elastomers

The New York Rubber Group is sponsoring a 15-lecture course in Elastomer Technology which will commence on Monday, October 3, and conclude on January 30. The lectures will be given at the Engineering Societies Building, 29 W. 39th St., New York, N. Y., from 7:30 to 9.45 p.m., one evening a week.

The lectures will deal with the history, economics, chemistry, and technology of natural and synthetic rubbers and with polyethylene and polyvinyl chloride, since the latter two materials have been increasing in importance to the rubber industry very rapidly in recent years.

Because of limited facilities, registration will be closed when the first 125 applications have been received. If the demand is sufficient, however, the course will be repeated.

A detailed announcement and registration forms will be mailed to Group members about September 10. C. V. Lundberg, Bell Telephone Laboratories, Murray Hill, N. J., is chairman of the Group's educational committee.

CALENDAR

September 22
Southern Ohio Rubber Group. Fall Technical Meeting. Engineers Club of Dayton, Dayton, O.

September 25-28
American Institute of Chemical Engineers. National Meeting. Lake Placid, N. Y.

September 29
Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

October 4
The Los Angeles Rubber Group, Inc. Statler Hotel, Los Angeles, Calif.

October 5-9
World Plastics Fair & Trade Exposition. National Guard Armory, Los Angeles, Calif.

October 7
New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
Chicago Rubber Group. Furniture Club, Chicago, Ill.
Detroit Rubber & Plastics Group, Inc.

October 13
Northern California Rubber Group.

October 14
Boston Rubber Group, Somerset Hotel, Boston, Mass

October 17-21
Forty-Third National Safety Congress & Exposition. Chicago, Ill.

October 18
Elastomer & Plastics Group, Northeastern Section, ACS. Science Park, Boston, Mass.

October 19
Washington Rubber Group. Pepco Auditorium, Washington, D. C.

October 24-26
American Standards Assn. and National Bureau of Standards. Sixth National Conference on Standards. Sheraton Park Hotel, Washington, D.C.

October 28
Philadelphia Rubber Group. Poor Richard's Club, Philadelphia, Pa.

November 1
The Los Angeles Rubber Group, Inc. Statler Hotel, Los Angeles, Calif.

November 2-4.
Division of Rubber Chemistry, ACS. Bellevue Stratford Hotel, Philadelphia, Pa.

November 3
Rhode Island Rubber Club. Pawtucket Country Club, Pawtucket, R. I.

November 10
Northern California Rubber Group.

November 11
Chicago Rubber Group. Furniture Club, Chicago, Ill.

Other Industry News

RTANY Considering New Central Unloading Terminal in Newark

Port of New York rubber importers have announced their intention of finding new unloading berths in order to centralize their rubber handling facilities and to obtain cheaper pier storage or demurrage rates.

That Port Newark, which is controlled by the New York Port Authority, would be the probable site of such new facilities, if negotiations are completed, was revealed by Vincent A. G. O'Connor, Marine & Aviation Commissioner of New York, N. Y., who said publicly that city officials were fighting to keep the $318,000,000 rubber importing business from moving to Port Newark.

Mr. O'Connor's counterproposal was to consolidate the rubber unloading operation at Piers 10, 11, and 12 on Stapleton, Staten Island, recently vacated by the Army Port of Embarkation. Rubber handling facilities are now concentrated on other parts of Staten Island and in Brooklyn.

Representatives of the Rubber Trade Association of New York who favor the transfer of unloading facilities out of the Port of New York, though not necessarily to Newark, contend that it would be cheaper to have a centralized spacious terminal equipped with special machinery to handle the 250-pound rubber bales.

An Association spokesman, Arthur Gary, said importers were paying between $300,000 and $500,000 a year in demurrage rates. This cost, he added, would be another factor in affecting any future decision to leave Port of New York piers.

Most steamship company officials, however, have flatly denounced any projected move to a centralized unloading terminal. Scheduling the arrival of ships in order to prevent congestion at the piers would be almost impossible, they say.

Firestone Announces New Synthesized Natural Rubber

The Firestone Tire & Rubber Co., Akron, O., has announced that it has in pilot-plant production a new type of synthetic rubber which promises to replace natural rubber in truck tires. The pilot plant has been in operation for two years, it was revealed, and more than 500,000 miles of tests on truck tires made of the new rubber have so far been conducted by the company.

In making the announcement, Harvey S. Firestone, Jr., board chairman, said that "patent rights, research data and small experimental quantities of the new rubber are being offered to the Department of Defense and the rubber industry in the national interest of establishing a reliable domestic source of supply of rubber that would be the equivalent of natural rubber for use in military truck tires."

Mr. Firestone further stated that 2½ years ago Firestone scientists determined by infrared and X-ray analyses that the man-made rubber was essentially the same as natural rubber.

"Further tests showed that this new-type synthetic rubber had physical properties at normal and elevated temperatures equivalent to those of natural rubber, whereas all other synthetic rubber developed up to 1953 had been deficient in these respects," he said.

Goodrich-Gulf Chemicals, Inc., jointly owned by The B. F. Goodrich Co. and Gulf Oil Corp., previously announced that it had duplicated synthetically the natural rubber molecule and was building a pilot plant in northern Ohio for the production of the rubber in semi-commercial quantities.

General Tire and Respro, Inc., to Merge

The General Tire & Rubber Co., Akron, O., will ask its stockholders on October 10 to approve the merger of Respro, Inc., Cranston, R. I., into General's plastics operations. With the necessary majority of Respro stockholders already having approved the proposed arrangement, the merger appears a foregone conclusion.

Under the terms of General's offer, the basis of the merger would be an exchange of 6¼ shares of Respro's capital stock for one share of General's 5% Cumulative Preference stock, $100 par value.

Respro and its subsidiaries, which include United Lace & Braid Co., Lion Products Co., and United Chemicals, Inc., manufacture shoe materials, electrical tapes, insulation, and various types of fabrics, such as impregnated and coated, woven and unwoven, and rubberized.

Upon final approval of the merger, Respro would be operated as a division of General Tire under the present Respro management, according to William O'Neil, president of General Tire.

Linde Readies Silicone Plant at Long Reach

Production at Linde Air Products Co.'s new $14,000,000 silicone plant at Long Reach, W. Va., is scheduled to start in the fall, according to R. S. Abrams, plant manager. About 200 people will be employed by the end of 1955, with the number going to 350 when presently designed facilities are in full-scale operation.

Linde, a division of Union Carbide & Carbon Corp., New York, N. Y., already has a silicone plant at Tonawanda, N. Y. The company says it has been engaged in research and development work in the silicone field since the late 1930's.

To Exchange Technical Data

A long-term technical service contract for the exchange of information on industrial and commercial developments has been signed by The General Tire & Rubber Co., Akron, O., and Metzeler Gummiwerke A.G., Munich, Germany.

The German firm employs 2,000 and operates one plant in Munich for the manufacture of tires and tubes, and another in Memmingen, Bavaria, for the production of latex products. Secondary products manufactured at the facilities include surgical rubber goods, floor coverings, molded goods, waterproofing materials, and sporting goods.

General previously signed similar agreements with firms in the Netherlands, Portugal, Spain, Italy, and Switzerland. It also operates plants in Canada, Mexico, Venezuela, Brazil, Chile, South Africa, and Israel.

"Natural" Rubber Pilot Plant

A pilot plant to make synthesized natural rubber will be constructed in northern Ohio by Goodrich-Gulf Chemicals, Inc., Cleveland, O., according to William I. Burt, president. The facilities are expected to be in operation within a year, at which time quantities of the rubber will be made available for testing purposes.

Development of the man-made tree rubber was first announced in 1954 by Goodrich-Gulf scientists working in The B. F. Goodrich Research Center, Brecksville, O. Large-size truck tires made entirely of the rubber were recently revealed.[1] The rubber is said to be a chemical and physical duplication of the natural product.

[1] RUBBER WORLD, Aug., 1955, p. 635.

William Blalock has been appointed West Coast technical representative for stearates for Witco Chemical Co.

Vanderbilt Advances, Appoints 10 to Research and Sales Staffs

Lorstan Studios

William F. Abbey O. B. Samler Arthur C. Rowley

Ten advancements and appointments in the research and sales staffs of R. T. Vanderbilt Co., New York, N. Y., have been announced.

William F. Abbey has been promoted to assistant manager of the East Norwalk, Conn., rubber laboratory, where Howard C. Beadle and Kenneth M. Deal have been recently added to the laboratory staff, and Thomas J. Farley, Thomas E. Kelley, and Arthur C. Rowley have been added to the technical staff.

Arthur L. Hollis has joined the company's technical staff and will act as technical representative to the synthetic rubber producing plants and other rubber companies in the Texas area.

Hugh F. Bethell has been transferred from his technical sales territory to the company's home offices, where he will be assistant to Ervin S. Kern in relation to technical sales and services.

Robert Loveland has been transferred to the New England sales area, replacing the late Gladding Price; while O. B. Samler has been appointed technical sales representative for the New Jersey and Philadelphia area.

Mr. Abbey, one-time chief chemist of the Pottstown, Pa., plant of The Firestone Tire & Rubber Co., joined Vanderbilt in 1950 and served on its technical staff, in its laboratory, and as technical salesman.

Mr. Beadle was formerly with United States Rubber Co., where he was active on mechanical goods production problems.

Foto Art Studios

Arthur L. Hollis Hugh F. Bethell Robert Loveland

Mr. Deal, previously with The Goodyear Tire & Rubber Co. and American Foam Rubber Corp., will be engaged in latex compounding and development problems at Vanderbilt.

Mr. Farley formerly had been with U. S. Rubber, U. S. Rubber Reclaiming Co., and Essex Rubber Co.

Mr. Kelley's previous employment had been with Jenkins Bros. and Sponge Rubber Co.

Mr. Rowley, formerly with U. S. Rubber and General Electric Co., will in addition to his laboratory technical development work, concern himself with technical sales.

Mr. Hollis, before coming to Vanderbilt, had been with The B. F. Goodrich Co. for 13 years, during which time he was on a four-year temporary loan to the government as consultant and technologist in the administration of the GR-S and GR-I rubber programs in the Office of Synthetic Rubber.

Mr. Bethell has been with Vanderbilt since 1945, serving in the laboratory, as well as in technical sales to the wire industry. His earlier experience was gained at Norwalk Tire & Rubber Co. and G-E.

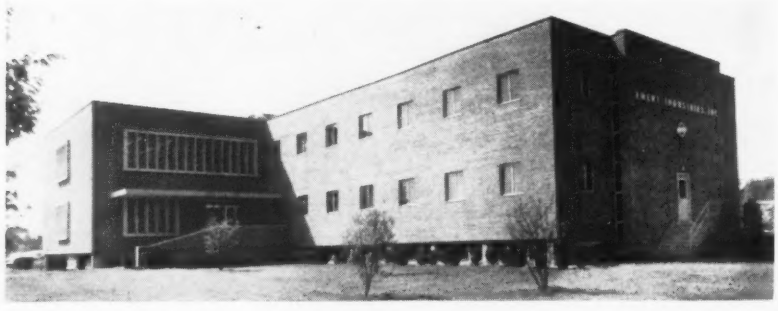
Mr. Loveland, with Vanderbilt since 1943, was formerly employed by R.C.A. Victor Co. and Johnson & Johnson.

Mr. Samler had been with Hood Rubber Co. before coming to the Vanderbilt company in 1952.

Emery Opens $800,000 Labs

Emery Industries, Inc., Cincinnati, O., has completed its $800,000 Twitchell Memorial Laboratories, the company reveals. The three-story building has 30,000 square feet of floor space containing 28 laboratories devoted to research in the fats and oils fields, as well as a chemical engineering department, development and service labs, a dry-cleaning plant for development of its Sanitone Service, a technical library, and executive offices.

Ceremonies opening the Laboratories were conducted June 13 by John J. Emery, company president, with Emery's board of directors and division heads, as well as Cincinnati's mayor and other local civic leaders, in attendance.



Twitchell Memorial Laboratories of Emery Industries, Inc.

Gates Rubber Co., Denver, Colo., has placed an order with General Electric Co., Schenectady, N. Y., for a 5,000-kilowatt gas turbine to generate electric power for its factory, the first such application of a gas turbine in the rubber industry.

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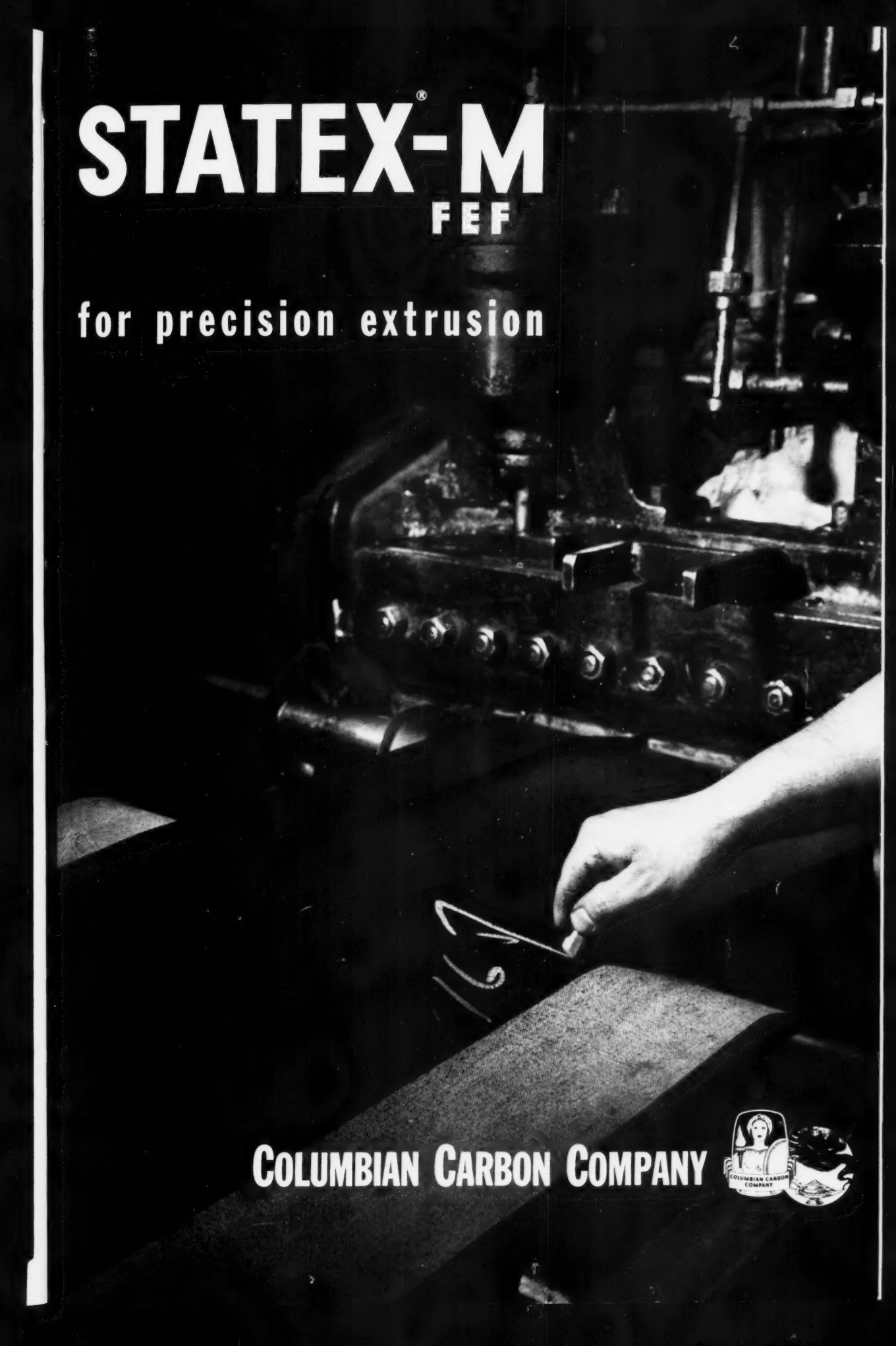
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Plan Titanium Sale to U. S.

A joint application to the United States Government for a contract under which the government would undertake for a five-year period to purchase 5,000 short tons annually of granular titanium metal has been submitted by Columbia-Southern Chemical Corp., Pittsburgh, Pa., and Imperial Chemical Industries, Ltd., London, England.

According to Columbia-Southern, the application states that the two firms have completed arrangements for the introduction into this country of a granular titanium process not at present employed here and would also make available to fabricators techniques not known to American industry.

Columbia-Southern, wholly owned subsidiary of Pittsburgh Plate Glass Co., Pittsburgh, has been engaged in research on the chlorination of titanium-bearing ores since 1937 and has numerous patents granted to it in this field, some of which have been licensed out to other firms.

Imperial Chemical Industries is a specialist in the production of granular titanium metal by a new sodium process.

If the government awards the contract under consideration, a new company, Columbia Titanium Co., would be formed by the two firms for the production of titanium metal through I.C.I.'s sodium-reduction process. A $10,000,000 plant would be built at Natrium, W. Va., which would have an annual capacity of 5,000 short tons.

The venture would accelerate the growth of a much-needed titanium fabrication industry in the United States, the companies believe.

Witco to Raise SRF Output

Plans to construct facilities at the Eunice, N. M., plant of Witco-Continental for the production of 25,000,000 pounds of SRF carbon black annually have been announced by Max A. Minnig, executive vice president, Witco Chemical Co., New York, N. Y., with which Continental Carbon Co., operator of the plant, is affiliated.

When the new gas furnace equipment is in full operation, the SRF output will boost the nation's production volume of this grade by 10%, Mr. Minnig said, adding that this increase is needed to meet the growing demands for automotive rubber products, such as tires, windshield gaskets, mats, grommets, and bushings.

Completion of the facilities is expected by the first quarter of 1956.

Sale of all Continental black production is handled by Witco Chemical Co.

Tubeless Cold Patch Kit

What is said to be the first self-vulcanizing cold patch kit for tubeless tires to be offered by the American rubber industry has been made available to its dealers by The Firestone Tire & Rubber Co., Akron, O. The kit includes 30 self-curing patches, vulcanizing fluid, a strip of filler rubber, threading tool and awl, wire buffing brush, and stitcher.

Permanent repairs can be made to all tubeless tires, except those containing puncture sealant, the company says. Injuries as large as 3/16-inch can be repaired without the use of internal heat or curing equipment.

Griffin's Studio

Frederick W. Barlow

Thermatomic Adding Labs

Additional laboratories for studying the application of carbon blacks to all phases of industry are now under construction at the Sterlington, La., plant of Thermatomic Carbon Co., affiliate of Commercial Solvents Corp., New York, N. Y., according to M. C. Wheeler, Thermatomic president.

Simultaneously, the firm's production of thermal-type carbon black will be stepped up by 15% as a result of increased production facilities scheduled for completion in January, 1956. Additional office space for executive and administrative personnel is also planned.

Frederick W. Barlow, a chemical engineer with 12 years' experience in the rubber and carbon black industries, has been engaged as laboratory director for the new research facilities. He was formerly associated with Godfrey L. Cabot, Inc., Neville Chemical Co., and Dominion Rubber Co., Ltd.

Symbolically posing around the first rubber tree planted on The B. F. Goodrich Co.'s land concession in Western Liberia, Africa, are *left to right*, Paramount Chief Zunnah Johnson, head of the Gola Tribe; Ralph Au, vice president of B. F. Goodrich Liberia, Inc.; and Richard Lee Jones, United States Ambassador to Liberia. Goodrich's land concession in Liberia now totals 600,000 acres

Baytown Officers Named

Announced officers of United Rubber & Chemical Co., Charleston, W. Va., recent purchaser of the Baytown, Tex., synthetic rubber plant, are Oscar Nelson, Jr., president; Osman E. Swartz, vice president; Grant Thomas, vice president for sales; Arthur Hanson, secretary; H. L. Hester, assistant secretary; C. A. Pauley, treasurer; and A. G. Treadgold, assistant treasurer.

The board of directors of the new company, a wholly owned subsidiary of United Carbon Co., Inc., consists of Nelson, Swartz, Hanson, Thomas, Pauley, Treadgold, and Wayne Harkness and T. A. Whelan. Ted Lyman, general manager of the Baytown facilities while it was being operated for the government by The General Tire & Rubber Co., will continue supervision of plant operations as general manager.

The plant has a rated annual capacity of 44,000 long tons of synthetic rubber. A substantial program of research and development, as well as physical expansion of the facilities, is included in future plans.

William F. Russell

Wm. F. Russell Upped

William F. Russell, associated with R. T. Vanderbilt Co., New York, N. Y., for 25 years, has been named director of research of the firm's rubber laboratories, East Norwalk, Conn. A research chemist, Dr. Russell is also an editor and author, having edited the company's *Vanderbilt News* from its inception in 1931 to 1940, edited the 1932 and 1936 edition of the "Vanderbilt Rubber Handbook," and written several papers on rubber technology.

Dr. Russell also has a number of patents issued in his name, one of which was granted in 1923 on the use of stearic acid in rubber compounds.

He received his Ph.D. degree from the University of Jena in 1910 and subsequently served as research chemist with The Diamond Rubber Co. and Norwalk Tire & Rubber Co. before coming to Vanderbilt.

Publish Metallic Soap Data

Detailed typical analyses of metallic soaps will be disclosed to consumers for the first time, according to Henry C. Milton, manager, manufacturers' chemical department, American Cyanamid Co., New York, N. Y., producer of such metallic soaps as aluminum, calcium, magnesium, and zinc stearates, and of zinc palmitate. The publication of these statistical analyses of the firm's production data for the past several years will give users in the rubber and other industries a more accurate evaluation of metallic soap than has ever been possible before, Mr. Milton asserted.

Jones Firm to Hewitt-Robins

Hewitt-Robins, Inc., Stamford, Conn., manufacturer of rubber and machinery products, has acquired the business, manufacturing facilities, and assets of W. A. Jones Foundry & Machine Co., Chicago, Ill., maker of heavy-duty speed reducers, pulleys, gears, and other accessories used to drive machinery, according to Thomas Robins, Jr., president of Hewitt-Robins.

The acquisition will enhance his company's strong position in the belt conveyor field, Mr. Robins explained, and will also give it added diversification of products for sale to industries using drives on equipment other than conveyors.

Purchase price was not revealed.

The Jones firm employs 400 and has an annual sales volume of about $4,000,000. The plant contains 165,000 square feet of floor space and five adjoining acres of land. Its equipment includes vertical and horizontal turret lathes, engine lathes, milling machines, radial drills, planers, grinders, and gear cutters of various types, in addition to a complete grey iron foundry.

The company will hereafter be known as the Jones Machinery Division of Hewitt-Robins, Inc., and Mr. Jones will be manager of operations.

Goodyear Rubber, Resin Used in Pressure-Sensitive Tapes

Pressure-sensitive tape for printing and marking using Chemigum N-7, Chemigum Latex 235AHS, and Pliolite S-5B as component raw materials has been developed by Coated Products, Inc., Bound Brook, N. J., according to The Goodyear Tire & Rubber Co., chemical division, Akron, O., producer of the materials.

The tape is said to have good tensile strength, strips freely from metal, glass, wood, or painted surfaces, is waterproof, and is priced economically. Temperature limits for application range from 60 to 115° F., with the post-application range at 0-160° F. Inks appropriate for printing are the aniline type, lacquer, or vinyl inks. General uses for the tape are in price marking, advertising and packaging information, labels, purchase displays, identification, and as strappings or bindings.

Function of the nitrile rubber Chemigum N-7, Goodyear says, used in the paper release coating, is to act as a non-migratory plasticizer. Having excellent adhesion to the impregnated paper and good solubility characteristics, Chemigum N-7 provides good compatibility with the vinyl resin used, has good light stability, is suitable as a grinding medium, and affords an excellent surface for writing or printing.

Chemigum Latex 235AHS, a nitrile rubber latex, is used in the tie-coat, or combining coat, because of its good adhesion to the impregnated paper, when combined with suitable resins, and its high mechanical stability and compatibility.

Pliolite S-5B, a high styrene resin, is an additive to the natural rubber adhesive and affords reinforcement to the adhesive film. It increases film strength, improves oxidation resistance, betters the tape's ability to strip away clean from the applied surface, has good compatibility with natural rubber, and good solubility in a mixture of aliphatic and aromatic solvents, without milling and without separation in the finished solution, according to the Goodyear Company.

Bead Wire Shipment Method by National-Standard

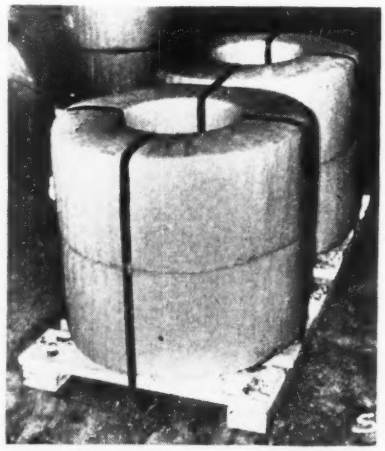
A palletized reel-less package for the shipment of bead wire used in tire manufacture has been developed by National-Standard Co., Niles, Mich., replacing the 100-pound steel reels hitherto used to transport such wire and resulting in freight savings to the manufacturer.

The package consists of four bundles of wire attached to a wooden pallet, each bundle paper-wrapped, and the whole package weighing about 2,600 pounds net, with 54 pounds tare, according to the company. The tare in equivalent steel reels amounts to almost 400 pounds, and these are required to be returned to the supplier.

The palletized package can be unloaded and stored in less time and with less manhours of labor than required to handle the same amount of wire on steel reels, National-Standard explains. More rapid rotation of inventory and more efficient storage in a given area are other advantages now said to be possible.

To handle the package at the customer's plant, National-Standard has designed a let-off reel and related equipment which are to be maintained at the point of use. The expenditure for these devices is small compared to the savings in freight permitted, the company says. The devices include a coil lifter, an electric hoist, an air line supply, a wrench, and a saddle, in addition to let-off reels.

National-Standard reports that one leading tire manufacturer has been using the palletized package for the last two years with savings of several thousand dollars in freight cost annually. Bead wire packaged in this manner has also been exported to South America



Four paper-wrapped coils of bead wire, each weighing 650 pounds, secured to non-returnable wooden pallet

News about People

Fabian Bachrach

C. A. Stokes

Fabian Bachrach

Donald Simonds

C. A. Stokes, for the past 10 years director of research and development for Godfrey L. Cabot, Inc., Boston, Mass., has been elected vice president and technical director of Texas Butadiene & Chemical Corp., Houston, Tex. Dr. Stokes is also a director of Petrocarb, Inc.

Richard T. Wise has been appointed manager of the Akron tire plant engineering department of the B. F. Goodrich Co. Tire & Equipment Division, Akron, O.

Theophil H. Mueller, formerly president of Julius Kayser & Co., has joined The New Jersey Zinc Co., New York, N. Y., as assistant to the president.

James R. Frazier has been transferred to the sales operating staff of The Goodyear Tire & Rubber Co., chemical division, Akron, O.

Howard J. Peppercorn has been promoted to works manager of the Marion, Ind., plant of The General Tire & Rubber Co., Akron, O., and **Lester A. Kaye** has been named works manager of the Logansport, Ind., plant.

Donald Simonds has been advanced to central regional sales manager for Godfrey L. Cabot, Inc., Boston, Mass., and **Daniel B. Doherty** has been promoted to eastern division sales manager. **Ferd Nadherny** has been named assistant to Mr. Simonds.

Myron H. Wilt has been appointed to the rubber chemicals section of the development department, organic chemicals division, of Monsanto Chemical Co., St. Louis, Mo.

Earl R. Kelly and **Elmer E. Branum** have been added to the research division staff of The Goodyear Tire & Rubber Co., Akron, O., and have been assigned to cords and fabrics and the physical testing laboratory, respectively. Also added to the staff are **William E. Gibbs,** for diene synthetic rubbers, and **Wallace E. Morrow,** for organic research.

Robert G. Dunlop, rubber consultant, has assumed management of Smithers Laboratories, Akron, O. Founder of the laboratories **Vern Smithers**, will continue in an advisory capacity.

James A. Hughes, formerly vice president and general manager of Bryant Heater Division of Affiliated Gas Equipment, Inc., has been elected treasurer of Diamond Alkali Co., Cleveland, O., succeeding **Arthur W. Crossley,** who is resigning.

Raymond P. Rossman has been appointed director of research and development of Godfrey L. Cabot, Inc., Boston, Mass. He joined the firm in 1937, later becoming manager of its southwestern rubber testing laboratories and subsequently its assistant sales manager.

Mel Sutter Studio

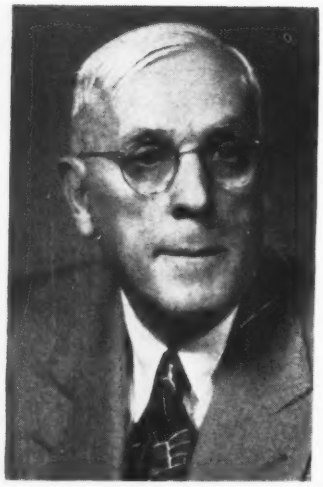
Ferd Nadherny

Fabian Bachrach

Daniel B. Doherty

Fabian Bachrach

Raymond P. Rossman



Ellsworth E. Neyland

Charles G. Overberger has been named head of the department of chemistry, Polytechnic Institute of Brooklyn, Brooklyn, N. Y. Associated with the Institute since 1947, Dr. Overberger received his doctorate at the University of Illinois, where he subsequently worked for two years as an associate on a Rubber Reserve project.

Robert W. Maney has been appointed general manager of Goodyear Tire & Rubber Co., of California, and **Richard V. Thomas** has been named Los Angeles plant manager.

Edward E. Forsythe has been advanced to manager-engineering of The B. F. Goodrich Co. Industrial Products Division, engineering department, Akron, O.

John R. Davis has been named technical sales representative to the Akron, O., district sales office for E. I. du Pont de Nemours & Co., Inc., elastomers division, Wilmington, Del.

Willard Stewart, Inc.

John R. Davis

W. Frank Chandler has been promoted to the post of director of transportation for United Carbon Co., Charleston, W. Va., and its subsidiaries. **Douglas A. Renau** has been transferred from the company's construction and production departments to its southern district sales staff. Joining the company are **Arthur V. Krone,** former chief of the traffic division of the Federal Facilities Commission, as traffic manager; **Ellsworth E. Neyland,** formerly with Seiberling Rubber Co., as synthetic rubber consultant; and **Charles W. Carroll,** formerly with The B. F. Goodrich Co., as Akron district salesman.

Douglas A. Renau

Francis A. Jones

Francis A. Jones has been promoted to manager of production control for Bolta Products, Lawrence, Mass., a division of The General Tire & Rubber Co. Mr. Jones was formerly purchasing agent at Bolta, the position now held by **Wayne Grubaugh.**

E. J. Fox has been advanced to assistant works manager of Carbide & Carbon Chemicals Co., division of Union Carbide & Carbon Corp., New York, N. Y.

Charles W. Carroll

Robert B. Lape, assistant corporate controller of the Restfoam division, Hewitt-Robins, Inc., Stamford, Conn., has been appointed eastern regional sales manager for the division with headquarters in New York, N. Y. Also named in the division were **Pitt B. Harris,** manager of field sales, to central regional sales manager with headquarters in Chicago, Ill., and **M. Randolph Wilkens,** sales service manager, to assistant to the general sales manager.

Cornelius C. Coakley has been appointed director of operations of National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y., and is succeeded as manager of the Division's Buffalo, N. Y., plant by **James F. Daly.**

Wallace E. Cake has been elected a vice president, a director, and a member of the executive committee of United States Rubber Co., New York, N. Y. Dr. Cake was formerly managing director of the company's plantation division, having spent 23 of his 33 years with U. S. Rubber on Malayan and Sumatran rubber plantations.

Pach Bros.

Wallace E. Cake

G.E. selects Enjay Butyl for versatile indoor-outdoor transformer casing

The use of Enjay Butyl in General Electric's molded transformer housing solved *three* particular problems—*insulation, support, casing.* G.E.'s engineers found that Enjay Butyl has low moisture absorption, fine resistance to corona and sunlight, and excellent adhesion to copper. In addition, it has a low power factor and good resistance to impact damage.

In electrical manufacturing and design, Enjay Butyl offers three outstanding features: excellent electrical properties, low cost, and immediate availability.

Enjay Butyl may well cut costs and increase the performance of *your* product. Get the facts on this extremely versatile, low-cost rubber. Complete laboratory facilities and technical assistance are at your service. Contact the Enjay Company today.

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35 SUCCESSFUL YEARS OF LEADERSHIP IN SERVING INDUSTRY

William L. Loving

Jim Morrison has joined Kirkhill Rubber Co., Los Angeles, Calif., as chemist.

Donald C. Johnson has been appointed development manager of The Crown Rubber Co., Fremont, O., where he will be responsible for the development of formulae for new products and processes. Crown, foam-coaters to the automotive, shoe, floor covering, and fabrics industries, has recently completed what is said to be the world's largest single foam-coating production unit.

General John E. Hull, U.S.A., (Ret.), former United States and United Nations commander-in-chief in the Far East, has been elected president of the Manufacturing Chemists' Association, Inc., Washington, D. C., succeeding **William C. Foster,** who has resigned. In 1945, General Hull served as a member of the executive committee of the Research Board for National Security, established by the National Academy of Sciences. General Hull will correlate the work of the Association's technical and advisory committees, among whose current activities is the development of safe practices for the storing, labeling, shipping, and handling of chemicals.

G. Donald Munger, William H. Brandt, and **Robert W. Layer** have joined the staff of The B. F. Goodrich Co. Research Center, Brecksville, O., and will devote themselves to fungicide evaluation, organic chemicals research, and chemical research, respectively.

Harold Zinnes has joined the research staff, technical division, of Baker Castor Oil Co., Bayonne, N. J.

Carl H. Pfrommer, assistant director of operations of Michigan Chemical Corp., St. Louis, Mich., has been transferred to the firm's New York, N. Y., staff, where he will have sales and sales service assignments there and in New England.

Fabian Bachrach

J. Boyd Britton

J. Boyd Britton has been advanced to operations vice president of Godfrey L. Cabot, Inc., Boston, Mass., and **William L. Loving** has been promoted to vice president and manager of the firm's carbon black division, Cabot Carbon Co.

John A. McNiff has been elected secretary of Mobay Chemical Co., St. Louis, Mo. He is a member of the New York Bar Association and the American Bar Association.

E. M. Hughes has been advanced to the post of assistant to the sales director of The Timken Roller Bearing Co., Canton, O., and **J. L. Brown** and **Don M. Brown** have been promoted to assistant manager of the sales order department and manager of the allocations department, respectively.

Carlton H. Gilbert has been appointed director of advertising for United States Rubber Co., New York, N. Y., succeeding **Thomas H. Young,** who has retired after 39 years of service with the company.

Pach Bros., N. Y.

Carlton H. Gilbert

Henry A. Thouron and **Charles S. Maddock** have been named synthetics department general manager and legal department director and general counsel, respectively, of Hercules Powder Co., Wilmington, Del. Elected vice presidents and members of the company's executive committee were **Wyly M. Billing** and **John R. L. Johnson, Jr.,** who are also company directors.

Clinton B. Burnett has been advanced to general manager of the Celite division, Johns-Manville Corp., New York, N. Y., succeeding **Arthur S. Elsenbast,** who has retired. Mr. Burnett continues as vice president of Johns-Manville Products Corp.

Robert J. Minchak and **Delbert W. Rosenbaum** have joined the staff of The B. F. Goodrich Co. Research Center, Brecksville, O., as chemical engineer and technical man, respectively. Also joining the Center's staff are **Robert F. Singer** and **Charles R. McCulloch** as junior technical man and chemist, respectively.

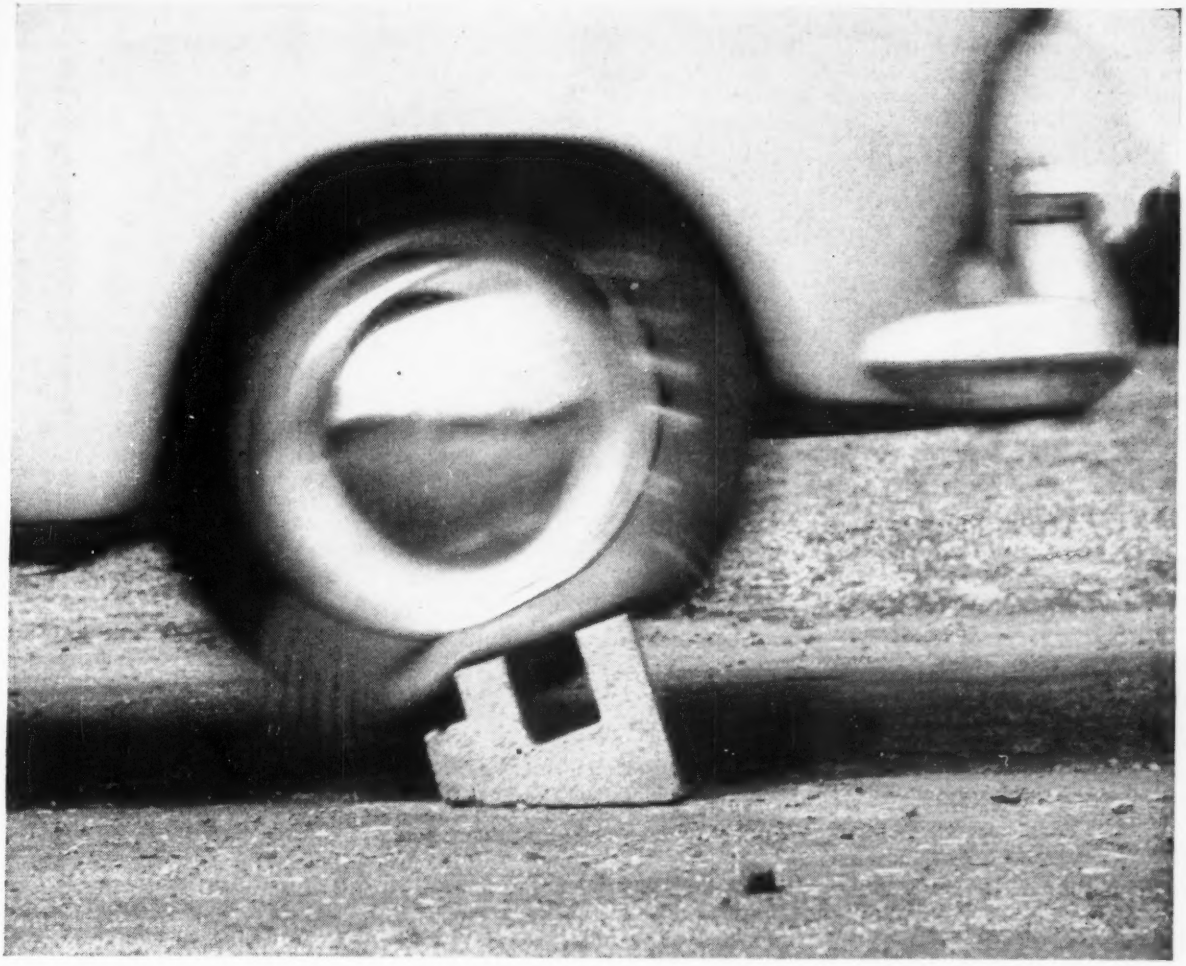
Tom Squire, formerly chief chemist at Franklin C. Wolfe Co., Los Angeles, Calif., has become associated with Griffith Rubber Mills, Portland, Oreg.

J. Frank Jacobs, for 21 years a tire engineering specialist with Pure Oil Co., Chicago, Ill., and for 10 years the firm's special representative to The Mansfield Tire & Rubber Co., Mansfield, O., has retired. A 40-year veteran of the tire and petroleum industries, Mr. Jacobs is credited with being the organizer of the nation's first chain of one-stop automotive service stations. Before coming to Pure Oil, he had been associated with United States Rubber Co. and The Firestone Tire & Rubber Co.

Vincent Madsen has been advanced from deputy managing director of the plantation division of United States Rubber Co., New York, N. Y., to managing director. He has been with the company since 1937.

Pach Bros., N. Y.

Vincent Madsen



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Tires made with Circosol-2XH have greater resistance to abrasion, and can take impacts and a rougher all around beating than tires made with cheap softeners. Circosol-2XH helps inhibit the spread of cuts and helps tires go through hard driving on hot summer roads without damaging heat build-up.

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SUN OIL COMPANY

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Manuel Esayian and **Ray V. Mihailovich** have joined the staff of The B. F. Goodrich Co. Research Center, Brecksville, O., on technical services and as junior technical man, respectively. Others recently added to the Center's staff and their functions include **G. Robert Moore**, junior technical man; **George Pescan**, physics department technical man; **Dwight M. Wever**, chemical engineer; and **Miss Rose Marie Winch**, junior technical man.

John P. Holmes, vice president of Celanese Corp. of America, New York, N. Y., and associated with the firm since 1927, has been elected to the board of directors.

G. K. McDonald has been advanced to assistant to the divisional production manager, chemical division, Koppers, Co., Inc., Pittsburgh, Pa., and will be succeeded as plant manager of the firm's Seaboard Plant, Kearny, N. J., by **W. K. Todd**, who will at the same time retain his present position as manager of the Chemaco Plant, Berkeley Heights, N. J.

Wallace S. Frank has been appointed supervisor of the process development unit, silicone products department, General Electric Co., Waterfield, N. Y.

Joseph A. Addison, manager of petroleum company sales for The Firestone Tire & Rubber Co., Akron, O., which he joined in 1916, has retired. He will be succeeded by **U. C. Brown**, formerly petroleum sales representative for the company. **G. M. Elliot** has been named assistant manager of petroleum sales.

A. K. Brill, development manager, Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O., has retired after 36 years of service with the firm. Named chief chemist and assuming Mr. Brill's former duties is **J. P. Mathews**, senior member of Republic's development and research department and associated with the company for 29 years.

Frank A. Seiberling

P. W. Litchfield, board chairman of The Goodyear Tire & Rubber Co., Akron, O., returned from Europe aboard the liner *Queen Mary* on July 26 in time to celebrate his eightieth birthday.

R. E. Bastian has been named manager of the mechanical building section of The Firestone Tire & Rubber Co., Akron, O., succeeding **John A. Hansen**, retired.

Joel Busch and **Dick Neschke**, formerly with Kirkhill Rubber Co., Los Angeles, Calif., have organized Extruded Products, Inc., Fullerton, Calif.

Obituaries

Frank A. Seiberling

Frank A. Seiberling, dean of the American rubber industry and founder of two major rubber companies, died August 11 in Akron, O. He was 95.

In 1898, he founded the Goodyear Tire & Rubber Co., with $3,500 of borrowed money and built it into the world's largest producer of tires, only to see it pass out of his hands in 1921 during the sudden onslaught of an industry-wide depression. Later that year, at the age of 62, he founded Seiberling Rubber Co. and served as its executive head for 28 years, retiring as board chairman in 1950, after having built up the company to one of the industry's leaders.

Mr. Seiberling was born in Western, Star, O., a hamlet five miles outside of Akron. He attended Heidelberg College at Tiffin, O., for two years, leaving it to work for his father, John F. Seiberling an inventor and manufacturer of farm machinery. Later, with his brother, C. W. Seiberling, he helped operate Akron's first electric street railway, which his father had gained control of, but subsequently left to become secretary-treasurer of his father's farm machinery firm. That firm collapsed in the nation-wide panic of 1893.

Five years later Mr. Seiberling agreed to pay $13,500 for 12 acres of land and some strawboard mill buildings in East Akron. He borrowed $3,500 as a down payment on the property and founded The Goodyear Tire & Rubber Co. He is given credit for having invented the first tire-building machine. He also introduced into the industry the first straight-side tire and detachable rim, as well as the modern small cord tire as a replacement for the old fabric-type tire. In 1916, Goodyear achieved the sales leadership among the world's rubber manufacturers.

An enthusiast of lighter-than-air craft, Mr. Seiberling had his company build thousands of military observation balloons and blimps for coastal patrol during World War I.

In 1921, with Goodyear sales at a record $200,000,000-a-year level, crude rubber and cotton prices suffered a drastic collapse in a general wave of financial panic, and the company passed into the hands of a group of outside bankers. Mr. Seiberling severed his association with the company.

Six months later, he launched the Seiberling Rubber Co., with plants in Barberton, O., and New Castle, Pa., the smallest of 300 rubber companies then in existence in the United States. Today, the company is among the nation's ten top leaders in tire manufacturing.

Mr. Seiberling had been dubbed "Mr. Akron" for his activities in furthering the civic development of that city. He founded several residential sections there, established a bus line, pushed through the development of roads and a Metropolitan Park System, built Akron's Seiberling Field, founded the Akron Institute for the Blind, the Akron Settlement Association, and various homes for the aged, and was a co-sponsor of the University of Akron's library building.

Memorial services for Mr. Seiberling were held on August 15 at his Akron home. Interment was in Glendale Cemetery.

Surviving are four sons, two daughters, and four sisters. Mr. Seiberling also leaves 21 grandchildren and 23 great-grandchildren.

Philip E. Young

Philip E. Young, president of Acushnet Process Co., New Bedford, Mass., which he founded in 1910, died June 17. A graduate of the Massachusetts Institute of Technology with a B.S. degree in mechanical engineering, he had been in the rubber business since 1909 and was the inventor of the Young gravitometer.

He held memberships in the New Bedford Country Club, Wamsutta Club of New Bedford, and the Riviera Club of Coral Gables, Fla.

Surviving are his wife, a daughter, a son, two sisters, and five grandchildren.

Joseph N. Turgeon

Philip E. Young

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News Briefs

New Jersey Zinc Co., New York, N. Y., has begun development work on its recently acquired Flat Gap property at Treadway, Tenn., for the exploitation of the lead-free zinc sulfide orebody there. A similar project has been under way at Jefferson City, Tenn., 25 miles from the Treadway site. About 2,000 tons of zinc ore per day from the Flat Gap mines will be treated in a yet-to-be-built mill and then carted by truck to Morristown, Tenn., for shipment by rail.

The B. F. Goodrich Chemical Co., Cleveland, O., reveals that bases made of its Geon vinyl plastic, filled with sponge rubber, are now in use by four major-league ball clubs. The bases, called Hollywood Star, have no straps or buckles to trip players and are washable and weather-resistant.

Monsanto Chemical Co., organic chemicals division, St. Louis, Mo., reveals that its di-isooctyl phthalate (DIOP) has been judged non-toxic by the Food & Drug Administration and is consequently approved in the form of films for use as food wrappers and as beverage, milk, and intravenous tubing, except for foods with high fat content.

Phillips Chemical Co., Bartlesville, Okla., has installed the eastern district sales office of its rubber chemicals division at 634 Hospital Trust Bldg., Providence, R. I., for the sales of Philprenes and Philblacks. Ralph B. Robintaille is in charge.

American Cyanamid Co., New York, N. Y., has reduced the tank-car price of acrylonitrile from 31 to 27¢ a pound because of the introduction of new production techniques at the company's recently completed Fortier Plant.

National Lead Co., New York, N. Y., through its subsidiary, Canadian Titanium Pigment, Ltd., will construct Canada's first titanium pigment plant near Varennes, P.Q., at a cost of about $15,000,000. The new plant is designed to meet Canada's entire requirements for titanium oxide, the company says. Production of titanium pigment is expected to begin in 1957. About 400 will be employed.

The B. F. Goodrich Co. Tire & Equipment Division, Akron, O., is test marketing in selected areas an automobile safety belt kit, said to be capable of easy installation by the car owner.

Velsicol Corp., Chicago, Ill., manufacturer of insecticides, resins, solvents, and saturants, has formed Velsicol International Corp., Chicago, to handle its foreign trade activities. E. T. Collinsworth, Jr., vice president and general manager of the parent company, has been named president of the new organization.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has settled its patent infringement suit against Nopco Chemical Co. pertaining to polyurethane foams and has granted Nopco a license under the patents in question.

United States Rubber Co., New York, N. Y., has introduced coordinated handbags and shoes made of the firm's Breathable Naugahyde, a new material with vinyl designs permanently applied to fabric.

Felters Co., Boston, Mass., has introduced a silicone-treated felt for the garment industry which is said to be water- and stain-proof and wrinkle-resistant and to have improved sewing properties, a more silky hand, and better draping qualities.

Anaconda Wire & Cable Co., New York, N. Y., has started production in recently built facilities at its Sycamore, Ill., aluminum wire and cable plant site, quadrupling the former output. Aluminum and copper production are conducted at separate locations to prevent contamination of one metal by the other.

Michigan Chemical Corp., St. Louis, Mich., has announced a program of considerable expansion of the production capacity of its magnesia plant, which will enable it to diversify product types for wider markets.

DeBell & Richardson, Inc., Hazardville, Conn., polymer and plastics research and development laboratories, has purchased the mill and water power of A. W. Dolge Co., which is adjacent to its 30-acre site and almost doubles its current working floor space. New chemical and engineering laboratories are expected to be constructed on the acquired land, and pilot-plant and pilot-manufacturing operations also will be expanded.

Carlisle Corp., Carlisle, Pa., has purchased Stoner Rubber Co., Stanton, Calif., with N. S. Van Rohr, former president of Stoner, remaining as general manager.

George Woloch Co., Inc., secondary raw materials dealer, has moved its offices from 82 Beaver St., New York, N. Y., to 601 W. 26th St., New York 1, N. Y.

West Virginia Pulp & Paper Co., polychemicals division, Charleston A, S. C., has changed the name of its lignin-GR-S masterbatch from Indulin-70-GR-S to polypol S-70.

Ohio Rubber Co., Willoughby, O., and **Standard Oil Co.** (New Jersey), New York, N. Y., together with two other firms, will each donate the services of an industrial nurse to serve on the Occupational Health Institute's newly created advisory committee of industrial nurses. International Business Machines Corp., Washington, D. C., and Equitable Life Assurance Society, New York, are the other two companies.

The Dayton Rubber Co., Dayton, O., has developed a new oxygen hose for jet-fighter pilots that carries radio communication wire on the outside, instead of the now-used inside wiring. The hose is said to eliminate possible spark-ignition of the oxygen and to minimize entanglement in the wire in case of bail-out.

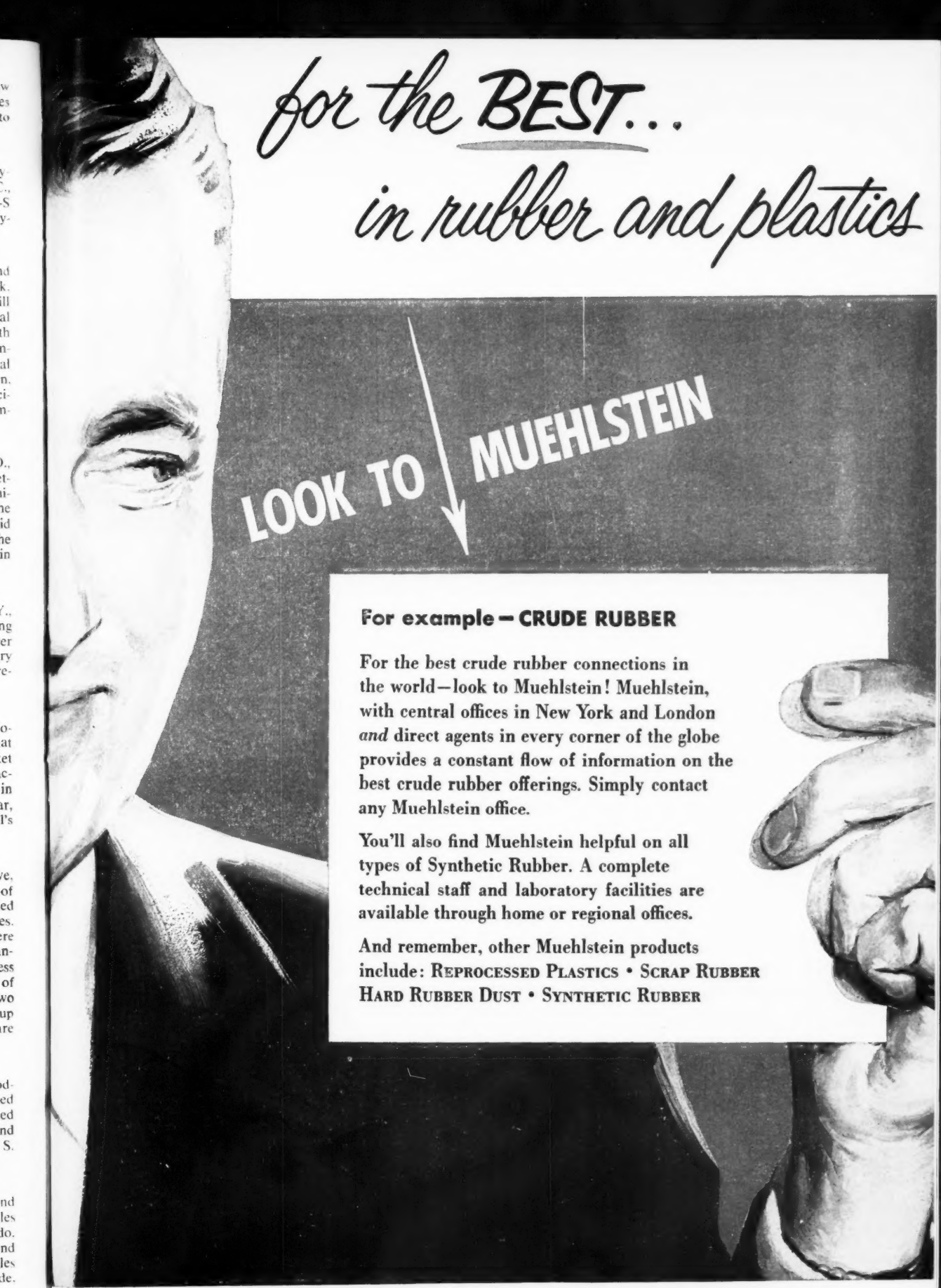
H. K. Porter Co., Inc., New York, N. Y., has purchased Electric Service Engineering Co., Joliet, Ill., designer and manufacturer of electronic devices used in heavy industry and in the Armed Forces, which will hereafter be known as the Eseco Division.

Hamgaper, Ltd., Haifa, Israel, a Wellco-Ro-Search affiliated factory, has set what is said to be a world's record for market coverage by a single footwear manufacturing firm by manufacturing and selling in 1954 more than 500,000 pairs of footwear, or enough to supply one-third of Israel's 1½-million population.

Porous Plastic Filter Co., Glen Cove, N. Y., has announced the availability of porous fluorocarbon filters in all-welded construction with molded flow passages. The Teflon and Kel-F in-line filters were designed for easy disassembly and cleaning, the company says, and compactness has been achieved with a square foot of filter area contained in a volume two inches high and 3½ inches OD. Sizes up to 10 square feet are available. Prices are up to 55% lower than heretofore.

The B. F. Goodrich Co. Industrial Products Division, Akron, O., has supplied eight-ton, bronze-encased, rubber-lined "Cutless" bearings for the four 75,00-pound propellers and propeller shafts on the U. S. Navy's super aircraft carrier, *Saratoga*.

W. A. Andrews, III, Neil McPhail, and **Richard A. Potter** have joined the sales department of The Lander Corp., Toledo, O., in general sales service, distributor and automotive sales service, and special sales representative to the distributor trade, respectively.



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News from Abroad

Malaya

Reaction to Collyer Stockpile Statement

The suggestion of the chairman of The B. F. Goodrich Co., John L. Collyer, early in July, that it would be economically advantageous and practicable to sell 200,000 tons of rubber from the U. S. Government stockpile, gave the rubber market here a bad jolt. It also called forth warnings and protests. In its weekly market report covering the period referred to, Holiday, Cutler, Bath & Co., Ltd., said, referring to the resulting demoralized market:

"This week again demonstrated that if America should break faith with southeast Asia and change its stockpile policy without due warning and careful consideration, the market reaction might be chaotic and have lasting international repercussions."

A Chinese rubber estate owner and merchant, the *Malay Mail* reported, urged the United States to ban "irresponsible" statements by Americans calculated to coerce natural rubber producers. He found that Mr. Collyer's statements resembled bullying, and while freedom of speech was not disputed, he felt that where this was calculated to damage the interests of an industry so essential to southeast Asian countries, the State Department should step in.

As everybody knows, the market quickly recovered to soar to new heights as a result of active demand, speculative buying, rumors of labor troubles, and reports of Russian buying (almost as much as actual Russian buying). A propos of Russian buying, the *Straits Times* correspondent reported from London that informed sources estimated that Russia had contracted for about 30,000 tons of rubber in the period May-August. It is expected that the Soviet bloc will take 170,000 tons this year.

Optimism and Nerves

The almost uninterrupted upswing of prices has bred a kind of nervous optimism —a tendency to look at the rosy side of things, but to keep one's fingers crossed. The Registrar of Statistics of the Federation Government, H. Fell, forecast in his monthly statistical analysis of rubber production and exports, that the price for top-grade RSS would remain high to the end of the year. This high price would be caused by the prosperity of the American worker, leading to buying of more cars, requiring more tires, and, in turn, more rubber. But then Fell quickly warned:

"My views are based on a very superficial appreciation of the situation and should, like all statements about rubber prices, be treated with reserve and not taken very seriously."

The Singapore rubber market also wants to remain optimistic, but is a little apprehensive underneath, and as prices keep mounting, the market seems to get jumpier. This condition was evidenced by the quick sharp drop (followed by quick improvement) on August 4, caused by what was called "a carefully circulated suggestion" that the G.S.A. was about to change American stockpile policy, which proved baseless. On the same day the market was again jolted—with more lasting after-effects —by the statement of Harvey Firestone, Jr., that his Louisiana GR-S type rubber plant was increasing output by 50% and would be able to produce at the rate of 150,000 tons annually by December.

Exports, Imports, Output

Malaya shipped 492,747 tons of rubber in the first half of 1955, 35,995 tons more than in the same period last year. Practically all the important consumer countries increased their purchases in 1955. The United States total, at 102,408 tons, showed the biggest rise—14,767 tons over the 1954 figure. Britain took 97,710 tons, against 95,835 tons; France, 49,845 against 42,287 tons; West Germany, 42,042 against 31,838 tons; Japan, 35,715 against 33,820 tons; Argentina, 15,017 against 10,514 tons; and India 3,233 against 626 tons. India must buy increasing amounts of Malayan rubber to eke out her own supplies for her growing manufacturing industry.

Italy, the Netherlands, and Australia, took less rubber from Malaya. Figures for Russia are not shown in Malayan exports, since her purchases are made through London; Iron Curtain countries—Bulgaria, Czechoslovakia, Hungary, Poland, Rumania—cut their purchases sharply from 7,586 tons in 1954 to 2,030 tons in the first half of 1955.

The share of latex in the exports increased markedly. Mounting latex imports by the United States were almost entirely responsible for the jump from 41,549 tons in the 1954 period to 56,984 tons this year.

Rubber imports into Malaya in the period under review declined to 172,805 tons from 176,689 tons. Indonesia's ban on exports to Singapore of lower grades on which the remillers there so largely depend caused arrivals of these grades to drop from 57,110 tons, or more than 32% of the total imports in 1954, to 25,640 tons, or less than 15% of total imports, in 1955.

Production figures for the first six months of 1955, the highest for the first half of a year since 1951, clearly showed the effect of a season of high prices on smallholders' output. Of the total for all Malaya of 305,329 tons, smallholders accounted for 140,776 tons, 35,889 tons more than in the like period last year. On the other hand, the 1955 estate figure of 164,553 tons was up only 4,550 tons over the 1954 total.

Local Trade Notes

A walk-out, lasting 4½ hours, was staged about the end of July by more than 2,000 workers employed in 24 rubber milling factories and packing go-downs in Singapore, in sympathy with 800 strikers at the Firestone Rubber Co. there. The union involved seeks negotiation with Firestone to settle the strike which began June 7. The company's stand has been that it is unable to meet the demands for increased pay and may have to close the factory.

With the price of rubber considerably above the top limit of the present sliding scale of wages—effective when prices are between 50 cents and $1 (Straits)—a new system will have to be worked out and the representatives of labor and employers recently met to start talks to this end. Under the existing agreement, wage rates are adjusted quarterly, based on the average price of rubber in each preceding quarter.

The Singapore Chamber of Commerce Rubber Association no longer quotes loose prices, but now quotes rubber available in go-down at spot f.o.b. terms which include packing costs and delivery charges to the ship, to the benefit of manufacturers.

That rubber gives a stronger type of road surface that has better weathering and wearing properties is the conclusion of the Public Works Department of Malaya, after years of testing. It is felt, however, that a full evaluation of rubberized roads has still to be made; it has also to be shown that they are in the long run more economical than ordinary bitumen roads which cost up to 30% less. Meanwhile the Department has embarked on a program calling for the surfacing of more than 20 miles of road with rubber-bitumen, for which 30 tons of powdered rubber have already been bought. The possibility of using rubber in a new road to link Petaling Jaya with Kuala Lumpur will also be considered.

Great Britain

Tenth Foundation Lecture

The Tenth Foundation Lecture of the Institution of the Rubber Industry was held in Birmingham, May 20, when E. A. Murphy spoke on "The Development of Latex Foam Rubber."

Mr. Murphy showed how more than 100 years were to elapse between the early

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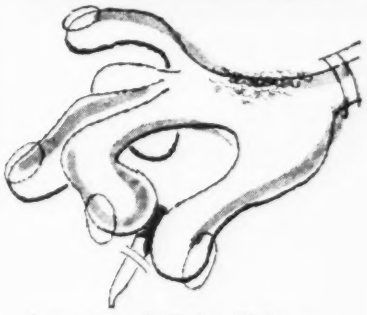

have proved their efficiency and versatility in countless applications. For example:

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- **3,125 lb** butadiene styrene emulsion
- **1,250 lb** neoprene latex

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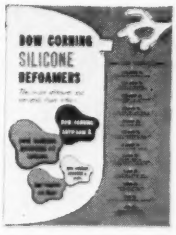

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attempts by the white man—as far back as 1824—to use latex in the manufacture of rubber goods and the development of Dunlop's process for making latex foam, which has led to an industry which in the United States and Britain is second in importance to the tire industry.

The first attempts to make sponge rubber from latex date from the patent of Schidrowitz and Goldsborough, in 1914; but the exploitation of this patent was broken off by World War I. The United States patent of Untiedt for whipping latex into foam followed in 1927, and in 1928, Dunlop patented a process combining the foaming operation with a delayed-action setting agent, which may be said to be the foundation of the industry as it is known today. In the meantime, however, World War II intervened and interrupted progress, which fortunately could be resumed with new vigor after the war, so that by 1953 the output of latex foam cushioning in the United States and the United Kingdom together totaled 86,000 tons and accounted for 60% of the latex consumption of the two countries.

In the course of his lecture Mr. Murphy dealt with the various stages in the Dunlop process, its introduction into the United States and Canada, and recent advances in foam rubber due to the Oakes process in the United States. This process as well as several others were described, as were methods for producing foam rubber from synthetic latex, particularly the German Moltoprene and foamed PVC, and physical properties were compared with those of natural foamed rubber.

While production is increasing rapidly in the United States, and at a steady pace in Great Britain and the Commonwealth (except India and South Africa), there is much room for expansion elsewhere, and Mr Murphy foresees that with the enormous potential markets of densely populated countries like India, Russia, and China, the next 25 years of growth of the foam rubber industry are likely to be even more spectacular than the first 25.

Henry Ridley Honored

Now in his one-hundredth year, Henry Nicholas Ridley, rightly considered one of the founders of the rubber plantation industry, has been honored by the Institution of the Rubber Industry. The Council of the Institution decided unanimously to award the 1955 Colwyn Gold Medal to Ridley and to make him an Honorary Fellow of the Institution. On June 2, 1955, S. A. Brazier, chairman of the IRI council, visited the frail old man in his home to make the presentation.

Born December 10, 1855, of distinguished ancestry (H. Ashplant in a tribute published in *Rubber Journal*, June 11, 1955, mentions among other ancestors Nicholas Ridley, Bishop of London, burnt at the stake in the reign of Queen Mary, and William Penn, founder of Pennsylvania, whose last descendant Ridley claims to be), he took his degree at Oxford with honors, and after various government appointments, was made director in 1888 of the Straits Settlements Garden, Singapore, where he immediately became interested in the possibilities of *Hevea*. He began his experiments on the cultivation and tapping of *Hevea* and prepared the first marketable rubber; at the same time he constantly urged planters to grow rubber, presenting them with seeds; indeed he was responsible for the distribution of several millions of *Hevea* seeds and plants not only in Malaya, but in other tropical countries too.

Rubber was not his only interest; his researches in botany earned for him a well-deserved name among scientists and planters, and two botanical societies have awarded him their medals.

Newton Leaves the Industry

R. G. Newton, deputy secretary of the International Rubber Research Board, has left the rubber industry to take up new duties as director of research of the newly formed British Glass Industry Research Association, in Sheffield. Newton began his career in the rubber industry on completing his studies at the Imperial College of Science, starting with latex work for the Rubber Growers' Association, then going on to the R.A.B.R.M. in 1938, which he left in 1948 to join the B.R.P.R.A. In recent years he has been particularly active in connection with Technically Classified Rubber, having been appointed Co-ordinating Officer for Technically Classified Rubber, on behalf of the International Rubber Research Board, in 1950, and in 1953, Deputy Secretary of the Board and the International Rubber Development Committee.

West Germany

Plan 45,000-Ton Buna Plant

The project for large-scale production of Buna in West Germany, under discussion for some time, is about to be carried out, but in modified form. The original plan provided for a plant to produce 30,000 tons of Buna annually—five times the amount now made; the revised plan calls for annual capacity of 45,000 tons which, it is calculated, will permit Buna being put on the market at competitive prices. The necessary amounts of n-butane from German and other West European sources are expected to be available by 1956.

Another important change is that the scheme will be handled by the four big chemical concerns, Chemische Werke Huls, Farbwerke Hoechst, Farbenfabriken Bayer, and Badische Anilin & Soda Fabrik. About 140 million DM. will be required to finance it so that outside capital will be required, and it is expected to get the necessary guarantees for the purpose from the government. The rubber industry has already promised its support in the initial stages of production.

Bunawerke Hüls Formed

Meanwhile, Bunawerke Huls, G.m.b.H., with headquarters in Marl, was formed on June 10 to undertake the preliminary studies for the erection of the synthetic rubber factory; it will be under the management of P. Baumann. The Huls concern has a 50% share in the capital of 120,000 DM., the three other companies are participating equally in the balance. It is expressly stated that in the establishment of this company the firms concerned have entered no agreements going beyond the production of synthetic rubber.

New Buna Fund to Aid the Scheme

The Association of the German Rubber industry decided at a meeting in Travemunde, June 15, to back the scheme by establishing a modified form of the Buna Fund. A levy of 0.10-DM. per kilogram on imported rubber is to be imposed for a period of five years, to provide a maximum of 10 million DM. annually, that is, a total of 50 million DM. over the five years, to protect the new undertaking against any losses it may suffer during that time.

In introducing the subject at the meeting, the president, W. Hoppmann, pointed out the disadvantage of the German rubber industry by comparison with the United States in the matter of costs of raw material at the June market levels. The United States, using 58% of synthetic rubber, reduces the average cost of all rubber to 2.50 DM. per kilogram; whereas the average cost to Germany, using about 12% of synthetic rubber, which is dearer here than in America, is around 3 DM., a difference of 20%. He looked for a shortage of rubber and quoted figures to show that potential world production of natural and synthetic rubber is now barely enough to allow for a further expansion of 5% in consumption over estimates for the current year.

He also took the opportunity to warn that the Association must be ever on the alert to obtain appropriate government trade regulations to prevent foreign competition from becoming dangerous. The areas to be chiefly considered in this connection are the United States, for all products requiring large material and capital resources, and southeast Asia, wherever cost of labor is important; also the Soviet Bloc, with its government-directed foreign trade and arbitrary price policy.

New Silicone Rubber

At the Industrial Fair, Hannover, 1955, Wacker-Chemie, G.m.b.H., Munich, featured a new silicone rubber which vulcanizes at room temperature instead of at 110-120° C. and is equal to the hot-curing types in all essential properties. It is supplied in three forms: (1) as cold-curing kneading paste, which is calendered to sheet for frictioning fabrics and making tubes, round tape, profiled products, etc. for use wherever hot curing is not possible—for instance, for carrying out repairs *in situ*; (2) as cold-curing, spreading compound for use in making cable strip and as cement for glass and porcelain to metal, or to themselves; and (3) as cold-curing casting compound for various purposes.

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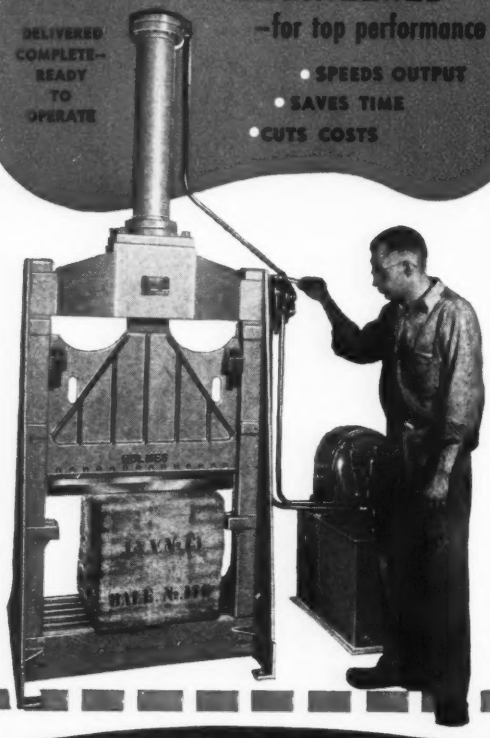

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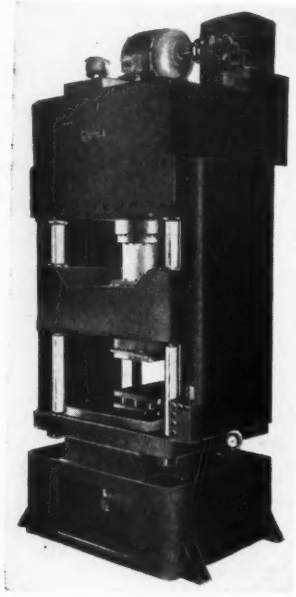
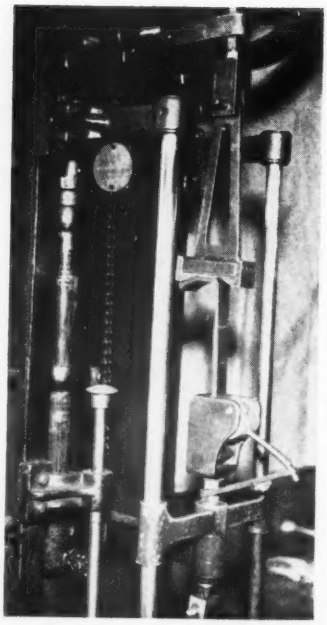


Clifton's Model 300 Hydraulic Press

Single-Action Hydraulic Press

A single-action hydraulic press that is electrically controlled for either automatic or semi-automatic operation has been placed on the market by Clifton Hydraulic Press Co., Clifton, N. J. Called Model 300, and available in tonnage capacities of 50, 100, 150, and 200 tons, in addition to 300 tons, and in any required speed, stroke, or platen size, the press features a slide return that may be controlled by either pressure or length of stroke setting and that may be inched up or down, or the press may be manually operated when the slide is in the up position. The pump bypasses at zero pressure.



Adhesion testing jig in Scott tensile tester

Rubber Adhesion Testing Jig

A jig that can be used to evaluate rubber-to-metal adhesion by measuring the 90-degree angle pull necessary to separate a one-inch wide strip of rubber from a metal surface to which it has been bonded in a simple molding operation is being manufactured by Scott Testers, Inc., Providence, R. I., through permission granted by Lord Mfg. Co., Erie, Pa., developer of the jig and the adhesion testing method, now adopted by the American Society for Testing Materials under designation D429-55T.[1]

The new method uses as specimens inexpensive sheet stock and permits the use of the usual Scott Tester found in rubber laboratories. In addition to the jig, Scott Testers is also making the mold needed for preparation of the specimen. Evaluation of the bond can be recorded on the standard Scott "picturized" chart which gives a permanent record convenient for filing and readily reproducible for correspondence, the company explains.

[1] RUBBER WORLD, Apr., 1955, p. 56

Memo

. . . to the Rubber Industry

The industry-wide acceptance of

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has lead to significant production increases that have made *two price reductions* possible within a year. The outstanding success of ANTIOXIDANT 2246 and its companion product,

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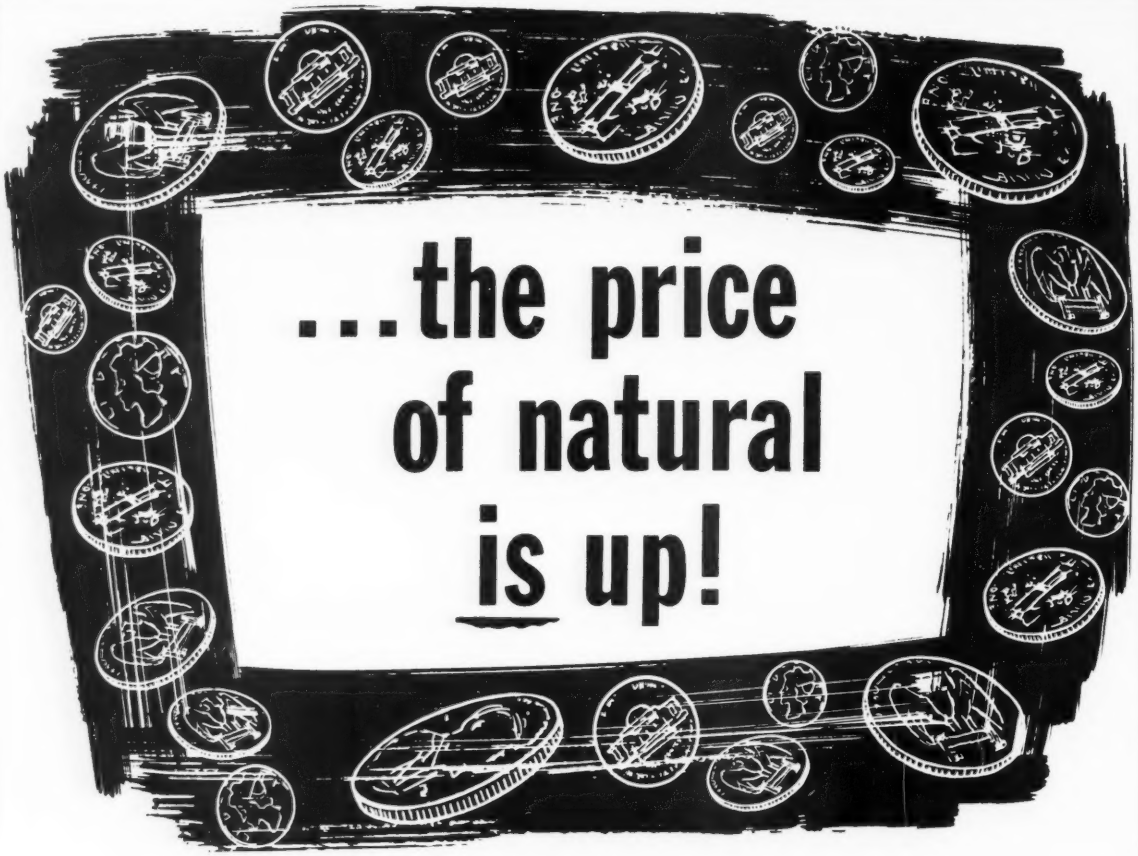

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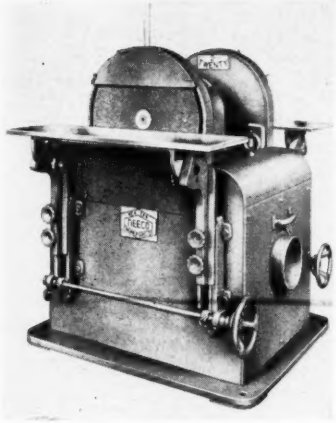


Neeco-2-Twenty Grinder

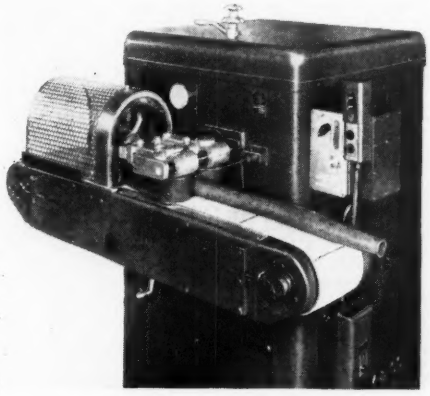
A grinder which operates at a perimeter speed of more than 18,000 feet per minute, utilizing abrasive coated cloth disks, has been introduced by New Era Engineering Co., Chicago, Ill. Designated Neeco - 2 - Twenty, the grinder is powered to handle the heaviest material loads without reducing disk speed.

The machine is reportedly flexible in that both rapid material removal and fine finish can be accomplished by using coarse grit abrasive on one disk and fine grit on the other. The unit is expected to be of interest to manufacturers and processors of metal products, plastics, ceramics, leather, hard rubber, wood, and paper.

The double-disk machine is powered with a 10-hp, 3600-rpm, motor, with a 220/440-volt, $^{2}/_{3}$-phase, 60-cycle direct drive. Other specifications include:

Disk diameter, in.	20
Work tables, in.	12 x 36
Base plate, in.	36 x 42
Maximum dimensions, in.	52¼ x 42
Height, in.	49
Weight, lbs.	2000

A dust collector is available as optional equipment. Housed within the machine, it consists of multiple filter-cloth bags over a steel framework and a turbo-axial blower mounted on the shaft of a 1½-hp. motor.



M-420-A Wink Universal Cutter

Automatic Cutting Machine

An automatic cutting machine for extruded items with a cutting length range from $^{1}/_{16}$-inch to 100 feet and a maximum diameter capacity of three inches has been placed on the market by F. J. Fink & Co., Cleveland, O. Called M-420-A Wink Universal Cutter, the machine is recommended for a variety of materials, including rubber, plastics, impregnated fabrics, reinforced hose, stranded wire, and natural and synthetic fibers. It has an all-geared head, convenient controls, and provides a length of cut which is independent of the overall speed of the machine.

Production rate varies greatly according to material being cut and other contributing conditions. O-ring molding slugs, $^{3}/_{4}$-inch OD by $^{3}/_{32}$-inch wall by $^{3}/_{32}$-inch long, are being cut at speeds in excess of 600 pieces a minute, with no mandrel required, however.

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Titre	8° — 10° C.	55° C. min.
Cloud Point	46° — 49° F.	
Color 1" Lovibond Red	2 max.	8 max.
Color 1" Lovibond Yellow	15 max.	50 max.
Unsaponifiable	1.5% max.	
Saponification Value	198 — 203	198 min.
Acid Value	197 — 202	190 min.
% F.F.A. as Oleic Acid	99 min.	
Iodine Value (WIJS)	93 max.	13 max.
Refractive Index 50° C. (Average)	1.4495	

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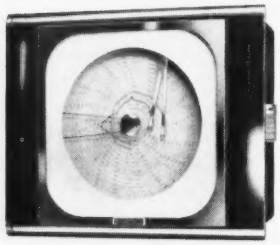
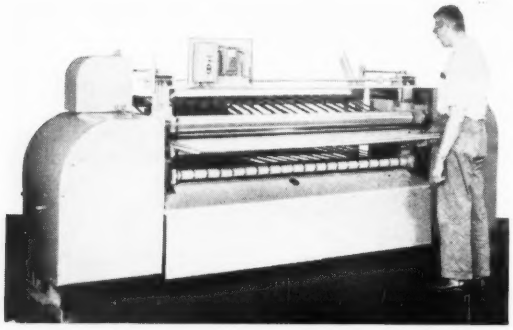
Two-Measurement Recorder



Bristol Dynamaster Recorder

A new round-chart electronic potentiometer recorder that can make two continuous records simultaneously on a 12-inch round chart has been placed on the market by Bristol Co., Waterbury, Conn. Called Dynamaster Recorder, the device is applicable to a variety of two-measurement applications, including the taking of wet and dry resistance bulb temperatures against humidity measurements, Btu and temperature differential measurements, and speed of rotation from two different points on a paper machine.



Case-Maul Universal Splitter

Foam Rubber Splitting Machine

A machine that will cut such soft material as foam rubber, sponge rubber, felt, or insulation to any desired thickness has been introduced by Case-Maul Mfg. Co., Mansfield, O. Designated Universal Splitting Machine, the improved model has an automatic winding feature and other refinements that widen its usefulness, the company says, and will achieve lower material costs and lowered inventories of materials which would otherwise have to be purchased in individual strips.

American Micro-Coder of American Marking Corp.

Friction-Driven Marking Machine

A newly designed marking machine that is friction-driven by contact with articles, usually on a conveyor system, has been put on the market by American Marking Corp., Newark, N. J. Called American Micro-Coder, and available in four sizes, models 10, 20, 22, and 23, the machine is suggested for printing such information as trade marks, codes, sizes, designs, weights, styles, or other desired data on a wide variety of materials including rubber, plastics, paper, cloth, and metals.

Featured in the design are totally enclosed double springs that hold the printing unit firmly in contact with the object being

(*Continued on page 804*)

HOGGSON TOOLS, MOLDS AND DIES
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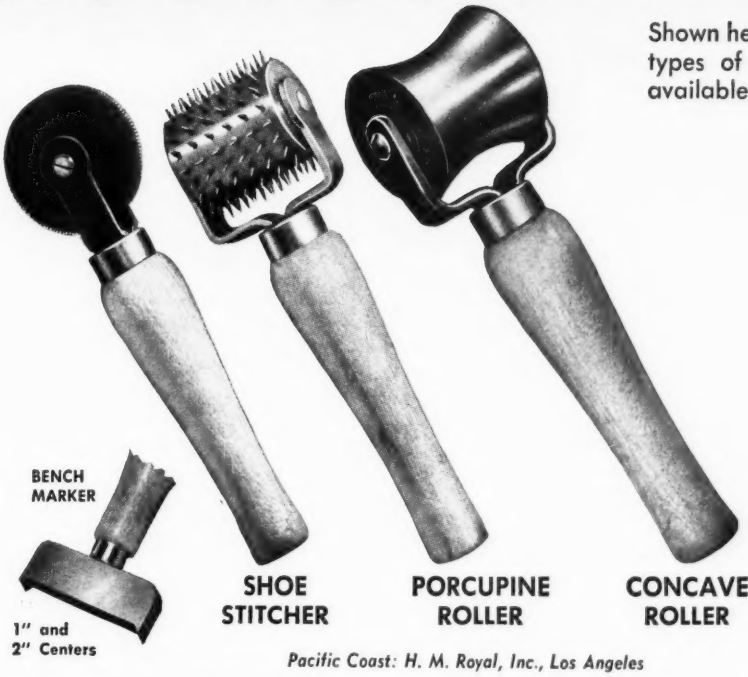
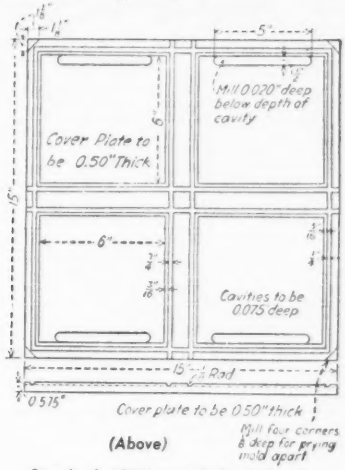


Shown here are but a few of the many types of rubber working equipment available. Please submit your problem.


Mill 0.020" deep below depth of cavity
Cover Plate to be 0.50" Thick
6"
Cavities to be 0.075 deep
0.515"
Cover plate to be 0.50" thick
Mill four corners 1/8 deep for prying mold apart

(Above)

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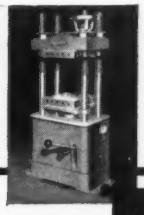

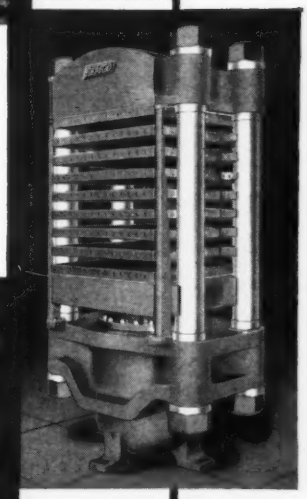

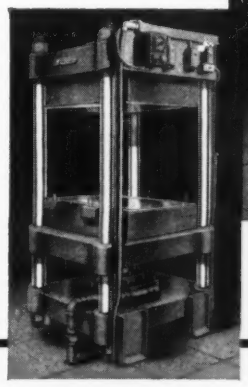

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NEW MATERIALS

Flexol Plasticizer 10-10

A primary plasticizer for vinyl chloride resins, Flexol Plasticizer 10-10, a distilled phthalate ester, has been made available by Carbide & Carbon Chemicals Co., division of Union Carbide & Carbon Corp., New York, N. Y. In addition to vinyl chloride resins, the material is said to show excellent compatibility with chlorinated rubber, vinyl chloride-vinyl acetate copolymer, cellulose nitrate, ethyl cellulose, and polystyrene, in 9:1, 4:1, and 1:1 ratios of resin to plasticizer. It is, however, incompatible with vinyl acetate polymer and cellulose acetate.

Flexol Plasticizer 10-10, which is di(oxo)decyl phthalate, is said to be the least volatile of the commercially available phthalate plasticizers. It has high resistance to extraction by water, good resistance to extraction by mineral oil, superior low-temperature properties, heat and light stability, and excellent electrical properties, according to the company. Suggested uses are in vinyl electrical insulation compounds, calendered film and sheeting, profile extrusions, synthetic rubber compounds, flooring compounds, and vinyl dispersions, including foam.

Some typical physical properties reported for the material are the following:

Specific gravity, 20/20° C.	0.9656
Boiling point, @ 5 mm. Hg.	261° C.
Vapor pressure, 200° C.	0.3
Absolute viscosity, @ 0° C.	577 cps.
20° C.	113.2 cps.
40° C.	35.3 cps.
Pour point	—37° C.
Surface tension, @ 20° C.	29.2 dynes/cm.

A technical data sheet describing Flexol Plasticizer 10-10 and reporting its performance in vinyl compounds at various ratios, F-8948-A, may be obtained from the company.

Vinyl Wire Insulation—Opalon 1038, 72254, 72217

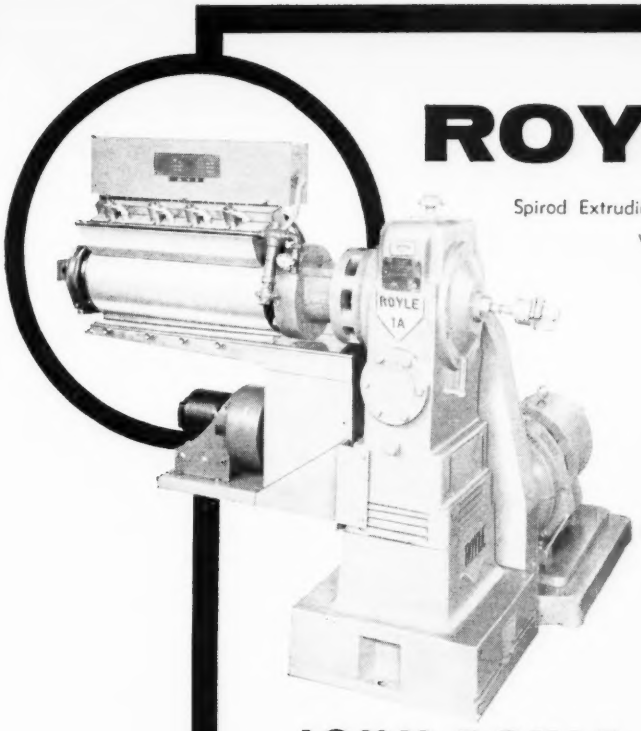
Three new vinyl compounds for wire and cable insulation, Opalon 1038, 72254, and 72217, have been introduced by Monsanto Chemical Co., plastics division, Springfield, Mass. Opalon 1038 is a primary insulation compound approved by Underwriters' Laboratories for Type T and TW uses and exposure to oil at 60° C., and is particularly suited for manufacture of large-size building wire and UF-NMC cable, with long retention of its flexibility, according to the company.

Opalon 72254 is reported to be a general-purpose, flame-retardant jacketing compound, is recommended for sheathing applications requiring good physical properties, flame retardancy, —40° C. low-temperature performance and weatherability, and is especially suited for REA telephone cables and meets the requirements of ASTM D1047.

Opalon 72217 is said to incorporate high shear strength, flame retardancy, and a high resistance to tearing and is especially practical for switchboard cable jacketing and inside telephone wire jacketing.

Some typical physical properties of the three compounds have been reported as follows:

	1038	72254	72217
Specific gravity, @ 23° C	1.37	1.41	1.39
Hardness, durometer A, @ 23° C	89	87	87
Tensile strength, psi., @ 23° C	2550	2360	2360
Ultimate elongation, %, @ 23° C	310	334	334
Modulus, @ 100% elongation, psi	1610	1320	1320



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FACILITIES REPORT

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importers and compounders

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INTERNATIONAL TECHNICAL ASSISTANCE DIVISION I.T.A. THE DAYTON RUBBER CO DAYTON, OHIO

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Cold Solder—Arcco C 540

A cold solder which performs the functions of a conventional hot solder, but requires no heat has been made available by American Resinous Chemicals Corp., Peabody, Mass. Called Arcco C 540, the solder is a combination of resin and metallic powder, bonds to most metals, and dries to a metallic film. The film can be buffed or filed and is said to be highly resistant to elevated temperatures.

50% Chlorinated Liquid Paraffin

A high-viscosity, liquid chlorinated paraffin with a 50% chlorine content, suggested as a flame-retardant liquid plasticizer for plastics and paints, has been developed by Diamond Alkali Co., chlorinated products division, Cleveland, O. Designated Chlorowax 50, the non-toxic, odorless, and water insoluble paraffin supplements the firm's Chlorowax 40, but has a chlorine content 25% higher than it. Viscosity of Chlorowax 50 is 125.0 (Gardner Holdt poises), and its specific gravity is reported to be 1.26.

Low Odor Advastab 50-671

A new polymeric thio organo-tin stabilizer, said to have an odor level unusually low for sulfur-containing compounds, has been introduced by Advance Solvents & Chemical Corp., New York, N. Y. Called Advastab 50-671, the stabilizer is compatible with all vinyl chloride-type resins and with most copolymers, is an excellent heat stabilizer in compounds where heat sensitive pigments are used to give light-colored shades to vinyl films, and is effective in stabilizing of vinyl compounds including high percentages of phosphate-type plasticizers.

Reported physical properties include the following:

Specific gravity, @ 25° C.	1.03-1.04
Pounds per gallon	8.65
Viscosity, @ 25° C. (Gardner)	A-1 to A-3
Refractive index @ 25° C.	1.48-1.49
Color	3-6 GH

Low Ammonia Centrifuged Latex—IVX-5

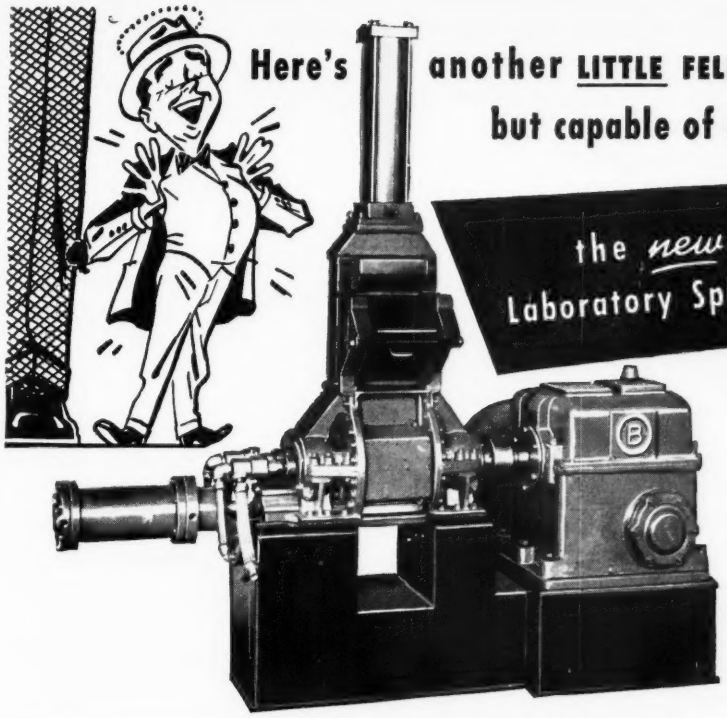
A low ammonia Harrisons & Crosfield centrifuged latex has been introduced by General Latex & Chemical Corp., Cambridge, Mass. Designated 1VX-5, the latex is said to have about the same mechanical stability as standard ammonia-preserved H & C centrifuged latex, as opposed to the very high mechanical stability of other low ammonia latices preserved with Santobrite or Versene, neither of which is involved as ammonia replacements in 1VX-5.[1]

According to the company, the advantages of 1VX-5 are the elimination of deammoniation in the manufacture of latex foam, the more tolerable working conditions the lower ammonia content provides in the adhesive and coating industries, and the absence of a retarding effect on vulcanization rates.

A typical analysis of 1VX-5 follows:

Total solids content, %	62.1
Dry rubber content, %	60.5
Total alkalinity, % (calculated as ammonia; expressed as % on H_2O in the latex)	0.47
pH	9.6
Mechanical stability, seconds	1170
KOH number	0.62
Copper content, % of total solids	0.00037
Sludge content, % of wet weight	0.016
Coagulum	none
Brookfield viscosity, LVF #1 spindle @	
12 RPM	130
30 RPM	100

[1] RUBBER WORLD, Aug., 1955, p. 612.



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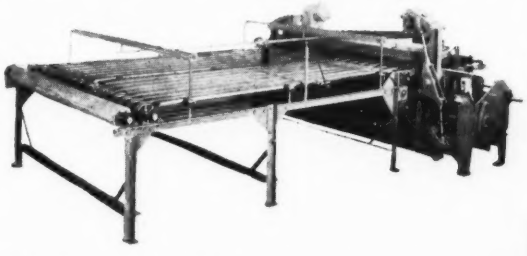

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FINE BR TOOLS

Mold Release Agent—Mold-Wiz

What is said to be a new type of mold release agent for rubber and plastics, having as its base "a group of complex high polymers," has been introduced by Axel Plastics Research Laboratories, New York, N. Y. Called Mold-Wiz, the substance is non-corrosive, non-toxic, and non-explosive, does not interfere with plating or painting of casted materials, imparts to casted items a hard mirror finish, and is applicable to both thermoplastic and thermosetting materials, according to the manufacturer. Mold-Wiz has a specific gravity of 1.0, a density of 8 lbs./gal., and a viscosity of 25 cps.

Roxite Waxes for Synthetic Rubber

Synthetic hydrocarbon waxes with a melting point range of 75-105° C. which can be used to protect oil-plasticized synthetic rubbers against sunlight have been placed on the market by Strohmeyer & Arpe Co., New York, N. Y. Called Roxite Hard Waxes, they are made from crude contact paraffin wax resulting from the Fischer-Tropsch catalytic hydrogenation of carbon monoxide gases. These waxes are said to be hard, tough, and varying in color from light yellow to pure white.

Another of their applications is in the manufacture of electrical wire coverings, since they have high di-electric properties and good thermal resistance.

GE Silicone Anti-Foam 60

A new silicone anti-foam emulsion for the prevention or suppression of foam in aqueous systems has been introduced by General Electric Co., silicone products department, Waterford, N. Y. Called Anti-Foam 60, it is a low-viscosity emulsion that is said to eliminate costly handling problems usually incurred through the use of conventional viscous, paste-type silicone anti-foam agents. The material pours easily, is readily dispersible, even in cold water, and is non-flammable. Typical applications are in latex processing, adhesive manufacture, textile finishing, and fermentation processes.

Some physical properties include:

Silicone solids, %	30±1
Viscosity, centipoises, @ 77° F.	250—750
Weight per gallon, lbs.	8.3—8.5
Specific gravity, 20° C.	1.01—1.05

Marking Machine

(Continued from page 798)

marked, enabling the machine to be affixed to any side of the conveyor without changing springs. The Micro-Coder has three rollers: a felt ink roller, a rubber transfer roller for even ink distribution, and a type roller. Two micrometer scale dials facilitate installing and adjusting the machine so that the rollers rotate together for proper contact with the article.

Plastic clamping rings lock the rubber type or logotypes into position. The type roller is also adaptable for use with adhesive back printing plates mounted on interchangeable sleeves. A 360-degree re-set for standard operations is supplied.

Interlocking Oven Sections

Six new infrared interlocking oven sections for such applications as industrial baking, drying, dehydrating, preheating, degreasing, and curing are available from Dry Clime Lamp Corp., industrial division, Greensburg, Ind. Called driQuik, the sections employ lava-coated ceramic-type infrared generators set in solid aluminum reflectors, are interlocking and completely wired, and can be used to construct an oven of any shape for stationary or mobile applications. Models of the sections are available with 500-, 650-, or 750-watt generators.

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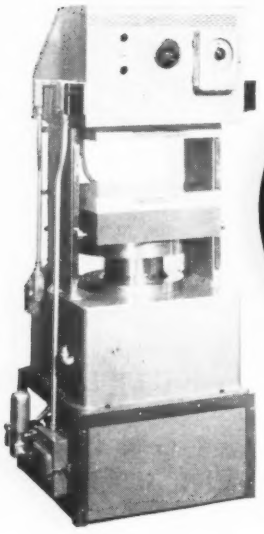

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Two position ram gives
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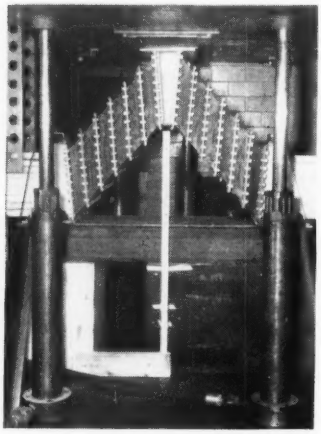

General Raykin Fender Buffer deflected 16½" during test

A rubber-and-steel cushioning device designed to smother shock and shear forces in docking operations, protecting both pier and ship, has been developed by The General Tire & Rubber Co., Akron, O. Dubbed General Raykin Fender Buffer, the V-shaped device is composed of a series of three-inch-thick and 15-inch-square rubber cushions sandwiched in between half-inch steel plates, with the outboard apex supporting whaling or pilings.

Available in a variety of sizes, depending on required duty, a typical fender is said to have a maximum energy absorption of 85,000 foot-pounds and can be deflected 3-18 inches. A 250% increase in efficiency is claimed over conventional buffers. The device is unaffected by corrosion, rotting, and aging, the company says. All motion is taken within the rubber, and rebound is minimized by hysteresis (damping) of the rubber compound.

Cellular Koroseal Upholstery

Upholstery material made of cellular Koroseal that is said to feel cooler than other plastic upholsteries because of its air-filled porous structure (50,000 inter-connecting cells to the square inch) has been placed on the market by the B. F. Goodrich Co. Industrial Products Division, Akron, O. Called Air-Porous Koroseal, the material, although porous, is water-repellent, the company says, is easily washed with soap and water, is available in a variety of patterns to simulate leather-like grains or fabric impressions, and comes in 20 colors for automotive, office, and home use.

Goodyear Hydraulic Hose

The industrial products division of The Goodyear Tire & Rubber Co., Akron, O., recently announced development of two new hose.

One, a wire-reinforced high-pressure hose designed for the hydraulic equipment industry and called Flexsteel hydraulic control hose, is said to be capable of withstanding pressures up to 5,500 psi. and to meet specifications of the military, the Society of Automotive Engineers, and The Rubber Manufacturers Association, Inc. Sizes are $\frac{3}{16}$-2 inches ID.

Hysunite Acid Handling Hose

A new acid handling hose, called Hysunite, will handle 96% sulfuric acid, 70% nitric acid, and 100% chromic acid. Goodyear further reports that results of field tests show the work life of Hysunite hose handling high concentrations of sulfuric, nitric, and chromic acids is measured in months, compared to a few hours with conventional acid hose handling these acids.

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The Country's Leading Makers

Cushioning Bags for Parachute Drops

Aero-Pallet Cushions beneath air-dropped 2½-ton truck

A barrel-shaped collapsible rubber bag that was designed to absorb the landing shock in parachute drops of heavy weapons and equipment has been developed by The Firestone Tire & Rubber Co., Akron, O. Dubbed Aero-Pallet Cushion, the device, placed in groups of four to ten beneath a magnesium pallet carrying up to 25,000 pounds of equipment, self-inflates when the load is dropped from a plane, has an automatically closing diaphram that keeps the bag inflated, and a rubber plug that pops out when the load has landed, permitting the bag to decompress.

The Aero-Pallet Cushion is made of nylon tire cord fabric covered with rubber and reinforced with strands of steel bead wire. This cushion can be reused for as many as 20 times and is said to cut ground impact by two-thirds, protecting valuable equipment.

These cushions are a part of a new system for equipment drops that has been developed by Firestone; Brooks & Perkins, Inc., Detroit, Mich., and Lockheed Aircraft Corp., Marietta, Ga., for the Wright Air Development Center of the Air Research and Development Command.

Cement-Rubber Industrial Flooring

A cement-rubber surface coating for industrial floors has been introduced by Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. Called Laticrete, the material consists of a cement powder and liquid rubber which are mixed together like concrete and spread in a recommended thickness of ¼-inch. Resistance to heavy loads, temperature changes, alkalies, mild acids, and water is claimed for it, and it is also said to dampen shock and noise and provide excellent traction.

Laticrete adheres well to clean surfaces of steel, aluminum, brick, tile and glass, the company reports, and, in addition to flooring, may be used as cushioning pads for heavy machinery, surfacing ramps, waterproofing storage-tank interiors, and eliminating dusting conditions on floors of food and drug plants and in hospitals. Pigmented mixes are available.

Thermoid Low-Weight Suction Hose

A fire engine suction hose of high flexibility and low weight has been placed on the market by Thermoid Co., Trenton, N. J. The hose has a black nylon wrap construction to obtain a cover of attractive appearance, the company reports. Available in seven sizes from 2½-inch to six-inch ID, the hose has a weight per uncoupled 10-foot length of 20-60 pounds, according to the size.

New Fire Extinguisher Tubing

Fire extinguisher tubing manufactured to meet Underwriters' Laboratory specifications of 400 psi. for five minutes also is available from Thermoid. The hose is applicable to water, soda-acid, or foam types of fire extinguishers and weighs 14 pounds per 100 feet. It comes in black or red, ⅜-inch ID, $1\frac{11}{16}$-inch OD, with one braid of reinforcement.

TECHNICAL BOOKS

BOOK REVIEWS

"The Colloid Chemistry of Silica and Silicates." Ralph K. Iler. Cornell University Press, Ithaca, N. Y. Cloth, 6 by 9½ inches, 324 pages. Price, $5.50.

Silica and silicates have always existed in great abundance on the Earth, and it is widely believed that they catalyzed the creation of the first life forms by adsorbing asymetric inorganic molecules which, with the passage of millenia, combined into complex organic molecules eventually capable of reproducing themselves. The subject of the colloid chemistry of silica and silicates, although seemingly a narrow one, is important in such diverse technological fields as geology, mineralogy, agronomy, zoology, and industrial chemistry, and the author has incorporated them all into his discussion of the basic chemistry of these materials.

The chapters of the text are admirably organized and efficient, covering, in order of increasing complexity, the silica-water system, the soluble silicates, the chemistry of silicic acid, esters of silicic and polysilicic acid, colloidal silica, amorphous silica gels and powders, colloidal silicates, surface chemistry of silica and silicates, and silica in living organisms. Excellent electron micrographs illustrate the discussion.

"Achema Year Book 1953/55 and European Catalog of Chemical Plant, Apparatus, Instruments." Published by Herbert Bretschneider, for Dechema, Deutsche Gesellschaft fur Chemisches Apparatewesen, Frankfurt a. M., 1954. Linen, about 8½ by 11¾ inches. 906 pages.

It is now 35 years since the late Max Buchman organized the first Achema (derived from *A*usstellung fur *chem*isches *A*pparatewesen, the German for Chemical Plant Exhibition) after having founded the Chemical Plant Section of the Association of German Chemists in 1918, and each succeeding Achema has advanced a step further, reflecting at once the growing importance of the work on chemical plant and the increasing participation of West European scientists and technologists in the Achema congresses.

The imposing 1953/55 year book suitably represents the high point that has now been reached in both respects, culminating as regards scientific cooperation, in the formation of the European Federation of Chemical Engineering in 1953. At first glance the handsome volume has little in common with its paper-backed predecessors, but closer examination reveals that fundamentally the old arrangement has been followed—there are again forewords by leading German and foreign personalities preceding an industrial section; a list of firms, a buyers' guide, a list of trade names, and the advertising section.

But there are important differences. To begin with, this year book is trilingual; for the first time the material has been presented in French and English as well as German; every article appears in the language used by the author with full translations —or in some cases summaries—in the other two. There are more or less detailed technical articles by 92 German and foreign firms dealing with their latest specialties—anti-corrosion linings of hard and soft rubber and plastics; high-temperature heating plants; special-purpose pumps with plastic parts; separation plants and processes for treating fatty alcohols, glycerines, mixed phenols (especially from lignite), isomeric nitro and chloronitro aromatic compounds; heating by electrical induction; new developments in the construction of laboratory testing equipment in East Germany, to mention but a few.

For the first time, too, there is a section on research institutes in which 26 European technological institutes give information on the scope of their activities, their organization and equipment, particularly with reference to work on chemical plant and apparatus.

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The list of firms covers 108 pages and gives names and postal addresses of 819 concerns, including more than 100 outside Germany, in the chemical equipment and apparatus field. The products of these firms are listed in detail in three separate trilingual catalogs—German-English-French; English-German-French; and French-German-English, respectively. Since about 6,000 different items are included, the whole constitutes a veritable trilingual technical dictionary.

The foregoing makes it clear that the Dechema has presented the chemical industry everywhere with a valuable reference work, which will undoubtedly find a place in many an industrial and technical library.

NEW PUBLICATIONS

Publications of E. I. du Pont de Nemours & Co., Inc., elastomers division, Wilmington, Del.:

"Facts about 'Hypalon.'" June, 1955. 2 pages. This is the first issue of a notebook series of published information on "Hypalon," du Pont's chlorosulfonated polyethylene, a rubber, and describes "Hypalon" acid hose and general properties of the material.

"Neoprene Notebook." June, 1955. 8 pages. Among the subjects discussed in this issue are rubber permeability, neoprene clamps for pipe leaks, neoprene-nylon bus air-brake diaphragm, and a neoprene diver's suit.

Publications of The B. F. Goodrich Co. Industrial Products Division, Akron, O.:

"B. F. Goodrich Hose for Tank, Butane-Propane, Fuel Oil." 2 pages. Photographs, construction, specifications, and recommended uses of these hoses are included here.

"Shoe Products for the Repair of Shoes." 14 pages. Illustrations and specifications of the firm's shoe heels, soles, and other items for the repair of shoes are contained in this catalog.

"Fittings for B. F. Goodrich Tank, Fuel Oil, Butane-Propane Hose." Bulletin 4015. 2 pages. These fittings are described and illustrated in this data sheet.

"Paracril Nitrile Rubbers—Aeronautical Material Specification Compounds." Technical Bulletin No. 8. I. E. Cutting. Naugatuck Chemical, Division of United States Rubber Co., Naugatuck, Conn. 16 pages. Recipes employing Paracril rubbers, designed for specific aeronautical applications in accordance with the Aeronautical Material Specifications of the Society of Automotive Engineers, are contained in this booklet, together with test data.

"VA-7 in Hycar 1042, GR-S 1502, and Natural Rubber." Bulletin No. 123. Thiokol Chemical Corp., Trenton, N. J. 7 pages. The properties and compounding in Hycar 1042, GR-S 1502, and natural rubber of the company's VA-7, a moderately priced aliphatic polysulfide vulcanizing agent for unsaturated elastomers are described on these data sheets. Test data of the resultant stocks are also given.

"Synthetic Organic and Pharmaceutical Chemicals." National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y. 6 pages. Structural formulae, descriptions, and properties of 51 chemicals and pharmaceutical intermediates made by the company are included in this folder.

"Aero Cyanuric Chloride." American Cyanamid Co., industrial chemicals division, New York, N. Y. 46 pages. The properties, chemistry, and applications of this material in such fields as rubber chemicals, plastics and resins, dyestuffs, textiles, and lubricating oils are described in this booklet.

"Chemical Market Abstracts Annual Index." Foster D. Snell, Inc., New York, N. Y. This index of market news and statistics for the chemical industry during 1954 covers such major subjects as company names, foreign countries, trade marks, and industrial uses of chemicals, as well as domestic and foreign patents.

"Your Handy Checklist of Helpful Diamond Literature." Diamond Alkali Co., Cleveland, O. This is a bibliography of technical and non-technical publications on the company's products, which include precipitated calcium carbonates, chlorinated paraffins, and plasticizers for the rubber and plastics industries.

"Diamond Chlorinated Solvents." 14 pages. Descriptions and physical data on the firm's chlorinated solvents, including methyl chloride, methylene chloride, chloroform, carbon tetrachloride, and perchlorethylene, are presented in this technical bulletin.

"Effect of Indonex Plasticizers in Banbury Mixing." Indoil Chemical Co., Chicago, Ill. 1 page. This technical data sheet reports data showing that Indonex 634½ compares favorably with a relatively expensive naphthenic-type heavy processing oil in laboratory-scale Banbury mixing of carbon black with GR-S and smoked sheet.

"Annual Report on the Progress of Rubber Technology." Vol. XVIII, 1954. Edited by T. J. Drakeley. Institution of the Rubber Industry, London, England. Cloth, 7¼ by 10 inches, 192 pages. Price, $3.00. This annual edition of the publication covers the major advances in rubber technology achieved during 1954. Each of the many facets of the rubber industry is reported upon by a recognized specialist in the field, and a running bibliography facilitates the task of those who want to probe further into a specific subject. In addition to a historical and statistical review, chapters on the chemistry and physics of raw and vulcanized natural rubber, one on synthetic rubber, and another on compounding ingredients, there are sections on the progress made in such specific products as tires, fibers and fabrics, belting, hose and tubing, cable, footwear, mechanical rubber goods, cellular and hard rubber, and flooring. Intensive subject and name indices are appended.

"Enjay Laboratories Technical Service." Enjay Co., Inc., New York, N. Y. 14 pages. This illustrated booklet describes the activities of the firm's newly built technical and sales service laboratories at Linden, N. J.

"Adipic Acid Properties and Reactions." Technical Bulletin O-105, Monsanto Chemical Co., organic chemicals division, St. Louis, Mo. 30 pages. Essentially a survey of the chemical literature on adipic acid, gleaned from the 1937-1953 *Chemical Abstracts*, this publication reports the properties, chemistry, and applications of adipic acid.

"Synvar Resorcinol Resins." Synvar Corp., Wilmington, Del. 15 pages. Descriptions and specifications of the firm's Synvaren PLS resins, including Synvaren PLS-R, a "stopped" resorcinol-formaldehyde resin for RFL treatment of rayon and nylon; and Synvaren 631 and Synvarite BRLD, resin adhesives for fiber glass and rubber, comprise this booklet.

"Plioflex Rubber, Pliolite Latex." The Goodyear Tire & Rubber Co., Akron, O. 24 pages. Essentially a history of the synthetic rubber industry in this country and the part that Goodyear has played in it, this illustrated booklet also includes a graphic production chart for GR-S type rubber and latices, as well as technical data on the materials and suggested applications.

"Wet Blast Cleaning & Finishing News." Vol. 1, Nos. 1 and 2. American Wheelabrator & Equipment Corp., Mishawaka, Ind. 4 pages each. These first two issues of a series of bulletins devoted to the company's Liquamatte wet blasting equipment give practical illustrations of the performance of a variety of Liquamatte machines in industry.

"El Papel Que Desempeñan Los Negros de Humo de Nivel Intermedio en el Caucho." I. Drogin, United Carbon Co., Inc., Charleston, W. Va. 37 pages. This is the Spanish translation of Dr. Drogin's paper, "The Role of Intermediate Level Carbon Blacks in Rubber," presented at the Rubber Technology Conference of The Institution of the Rubber Industry, June, 1954.

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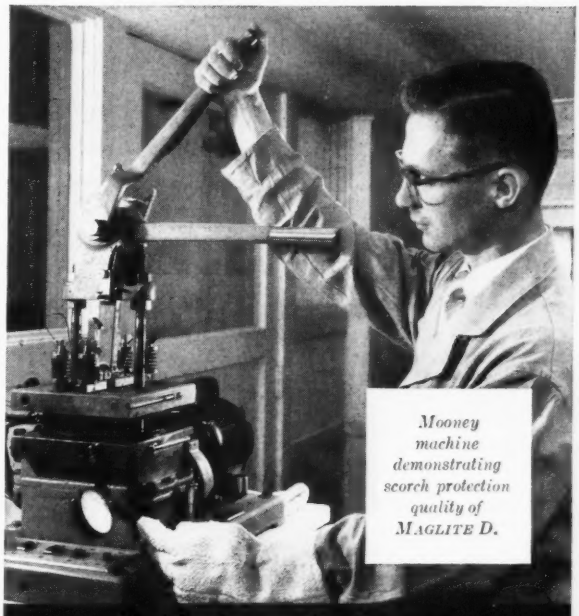

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Publications of Wyandotte Chemicals Corp., Wyandotte, Mich.:

"Chemical and Physical Properties of Purecals." Vol. 1, No. 1, 1 page. Test data on the firm's calcium carbonates, Purecals, are reported in this insertion to the "Chemicals for Rubber Handbook."

"Effects of Adding Purecal SC to Low-Quality Compounds." Vol. 1, No. 2, 2 pages. Formulations with increasing amounts of Purecal SC and resulting test data are included.

"Purecal SC in Neoprene Type W and GNA Skim and Friction Compounds." Vol. 1, No. 3, 1 page. Reported here are Neoprene friction formulae employing Purecal SC as filler, and resulting test data.

"A Loading Study of Purecal SC in Neoprene Types GN and W." Vol. 1, No. 4, 3 pages. Processing information, recipes, and test data on Purecal SC in these neoprenes as a means of improving stocks and lowering costs are contained here.

"A Loading Study of Purecal SC in Buna N." Vol. 1, No. 5, 2 pages. Processing, a recipe, and test data are reported in this study.

"Zinc Oxide Replacement with Purecal SC in White Sidewall Stocks." 5 pages. Recipes and the resulting test data of such substitution, effecting lower costs, are included.

"Corrections in 'Chemicals for Rubber Handbook.'" Pages 19 through 33 of Sec. A, Part IV.

Publications of Rubber & Asbestos Corp., Bloomfield, N. J.:

"Adhesive Bonding." 6 pages. This reprint of a published article deals with the factors which complicate the specifying of bonding materials and processing techniques and suggests the proper approach to the selection of the correct formulation and process for specific needs.

"Bondmaster Series 'M' Structural Adhesives." 12 pages. This special application report on the company's structural adhesives for porous and non-porous non-metals, metals, rigid plastics, and rigid plastic laminates discusses specific uses and application techniques and provides a chart for quick reference.

"Applications of Science in Rubber Technology." Imperial Chemical Industries, Ltd., Manchester, England. Cloth, 7¼ by 10 inches, 106 pages. Based on five lectures delivered at the Newton Health Technical School in Manchester for students of rubber technology, this publication is complementary to "The Fundamentals of Rubber Technology" previously issued by the company and attempts to achieve a liaison between lecture-room theory and industrial application. Subject matter includes a "General Introduction" by W. J. S. Naunton; "Chemistry and Rubber Technology" by J. T. Watts; "The Physical Statistics and Rubber Technology" by G. E. P. Box; and "The Sciences and Rubber Growing" by E. J. McNaughton. All of the lecturers are members of the staff of ICI. The many illustrations are enlightening, and the total effect of the book is one of thoroughness without duplication.

"Solubility of Zinc Oxide in Preserved *Hevea* Latex." Communication No. 229. M. Van Den Tempel. Rubber-Stichting, Delft, Holland. 10 pages. This booklet reports the results of an investigation, conducted principally by means of polarography, on the solubility of zinc oxide in *Hevea* latex and in model solutions containing an ammonium salt together with free ammonia. It was found that the solubility, at a given value of the pH, is proportional to the concentration of ammonia and ammonium salt together.

"AMA Workshop and Orientation Seminars." American Management Association, New York, N. Y. 50 pages. This booklet describes the complete program of the AMA's small-group management meetings to be held in New York, Cleveland, and Chicago between September, 1955, and June, 1956, on such subjects as manufacturing, general management, marketing, office management, personnel, insurance, and finance. Cost and registration information are included.

"Solvents for Every Industrial Need." Modern Mineral Solvents Corp., Perth Amboy, N. J. 4 pages. Specifications of the firm's organic solvents are reported in this folder.

"Rotary Files." Grobet File Co. of America, Inc., New York, N. Y. 16 pages. This is an illustrated catalog of the firm's wide range of rotary files for both hard and soft materials.

"Here's How to Joint Durasheath Cables." Anaconda Wire & Cable Co., cable accessories department, New York, N. Y. 8 pages. This pocket-size booklet contains pictorial directions for making cable joints in the company's Durasheath cables.

"Indicating Pyrometers." Bulletin F-6048-1. Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill. 2 pages. Models 141P, 192, and 196 indicating pyrometers for wall or panel mounting are described and illustrated in this publication.

BIBLIOGRAPHY

Criteria of the Technological Properties of Elastomers, Elastomer Mixtures, and Reclaimed Elastomers. I. I. Tugov, *Rubber Chem. Tech.*, July-Sept., 1954, p. 688.

The Proton Magnetic Resonance in Natural Rubber. H. S. Gutowsky, L. H. Meyers, *Rubber Chem. Tech.*, July-Sept., 1954, p. 705.

Tracer Method for Sulfur Solubility and Diffusivity in Rubber. I. Auerbach, S. D. Gehman, *Rubber Chem. Tech.*, July-Sept., 1954, p. 773.

The Fractional Precipitation of GR-S. L. H. Cragg, D. F. Switzer, *Rubber Chem. Tech.*, July-Sept., 1954, p. 784.

Chemical Analysis of GR-S by Complete Solution Procedures. I. F. J. Linnig, J. M. Peterson, D. M. Edwards, W. L. Acherman, *Rubber Chem. Tech.*, July-Sept., 1954, p. 796. **II.** F. J. Linnig, A. Schneider, p. 806.

Determination of Yellow Color in Raw Rubber Latex Films and Crepes. G. A. Kidder, *Rubber Chem. Tech.*, July-Sept., 1954, p. 810.

Phosphatides of *Hevea* Latex. R. H. Smith, *Rubber Chem. Tech.*, July-Sept., 1954, p. 828.

Swelling and Drying of Fuel O-Rings. R. A. Clark, R. M. Kell, *Rubber Age (N. Y.)*, Sept., 1954, p. 831.

Effect of Active Hydrogen on the Breakdown of Oil-Masterbatched Polymers. W. K. Taft, A. D. Snyder, J. Duke, *Rubber Age (N. Y.)*, Sept., 1954, p. 838.

The Ammonia-Resistant Bacteria Associated with Latex Deterioration. C. E. Rhines, J. McGavack, *Rubber Age (N. Y.)*, Sept., 1954, p. 852.

Chlorination of Natural Rubber Solution by Means of Phenyl Iododichloride. C. S. Ramakrishnan, D. Raghunath, J. B. Pande, *Trans. Inst. Rubber Ind.*, Oct., 1954, p. T. 129.

How Much for Rubber-Lined Vessels? R. W. Lundeen, W. G. Clark, *Chem. Eng.*, Mar., 1955, p. 191.

Hard Rubber. H. Peters, *Ind. Eng. Chem.*, Oct., 1954, p. 2112.

Coatings of Polyamide and Epoxy Resin Blends. M. M. Renfrew, H. Wittcoff, D. E. Floyd, D. W. Glaser, *Ind. Eng. Chem.*, Oct., 1954, p. 2226.

Effect of Sulfur and Accelerator Variation on Aging. W. L. Cox, J. R. Shelton, *Ind. Eng. Chem.*, Oct., 1954, p. 2237.

Oil-Resistant Rubbers from 2-Methyl-5-vinylpyridine. J. E. Pritchard, M. H. Opheim, *Ind. Eng. Chem.*, Oct., 1954, p. 2242.

Compounding Principles of Silicone Rubbers. C. W. Pfeifer, *Ind. Eng. Chem.*, Nov., 1954, p. 2342.

Silicone Molding Resins. H. N. Homeyer, J. H. Preston, S. Casapulla, E. M. Beekman, *Ind. Eng. Chem.*, Nov., 1954, p. 2349.

Reactions of Allylic Silicon Compounds. D. L. Bailey, A. N. Pines, *Ind. Eng. Chem.*, Nov., 1954, p. 2363.

Flow Properties of Vinyl Chloride Resin Plastisols. E. T. Severs, J. M. Austin, *Ind. Eng. Chem.*, Nov., 1954, p. 2369.

Friction and Lubrication of Nylon. R. C. Bowers, W. C. Clinton, W. A. Zisman, *Ind. Eng. Chem.*, Nov., 1954, p. 2416.

Sulfonation Products from Polymers of Styrene and Vinyltoluene. H. H. Roth, *Ind. Eng. Chem.*, Nov., 1954, p. 2435.

Fundamental Low-Temperature Retraction Studies of Natural and Synthetic Elastomers. L. J. Radi, N. G. Britt, *Ind. Eng. Chem.*, Nov., 1954, p. 2439.

Evaluating Shock Mounts. J. P. Walsh, R. E. Blake, *Mech. Eng.*, Mar., 1955, p. 231.

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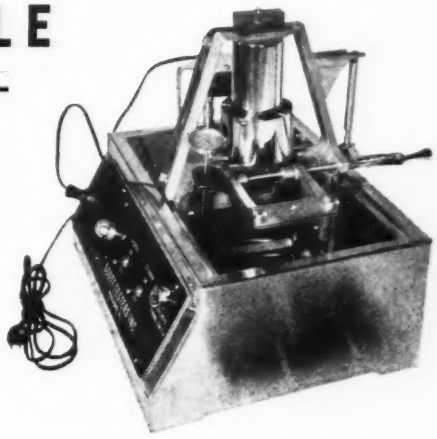

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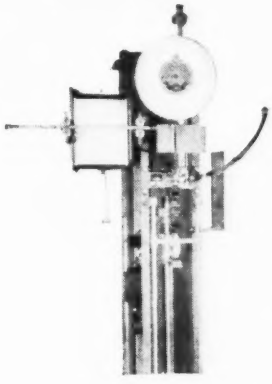

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MARKET REVIEWS

Natural Rubber

What was probably the heaviest trading in the history of the New York Commodity Exchange, accompanied by the highest price levels since free trading was resumed in 1947, made the period from July 16 to August 15 a memorable one for both spot and future rubber markets. A record 7,990 lots exchanged hands on the Exchange during the period, with 727 lots traded on July 29 alone, and the figures exceeding 500 on three days and 400 on four.

Continuing demand for top rubber grades caused the price of R.S.S. #1 to rise 7.75¢ a pound between July 15 and August 4; a record 48.13¢ was reached on that day. The price fell to 43.75¢ by August 15, but the upward trend began again the following day, when the #1 grade was quoted at 46.13¢.

No localized or specific events could be blamed for the spiralling prices or the spectacular volume of trading. Some nervousness was generated in the market by industry requests to the governmeent to release crude from its stockpile, but these demands were rejected soon after.

H. C. Bugbee, president of the Natural Rubber Bureau and a spokesman for Malayan producers, concisely rationalized the situation by placing responsibility on the unprecedented world demand for natural rubber, in spite of capacity production of synthetic rubber, particularly by American consumers. American consumption would probably reach 1,450,000 tons of natural and synthetic rubbers for 1955, he said, a figure startlingly in excess of the 1,255,000 tons predicted at the beginning of the year by spokesmen for U.S. tire companies.

It is obvious, therefore, that consumers had sadly underestimated their requirements and were scrambling to replenish depleted stockpiles. Apart from this fact, comparatively new sources, such as the Soviet Union and Red China, were dipping heavily into available supplies and apparently eager to take all they could get at whatever cost.

As to outlook for the monthly period ahead, it is difficult to conceive of a substantial drop in natural rubber prices, and it seems highly probable as of this writing that prices will rise even further. Some natural rubber spokesmen, alarmed at what they think is an unnaturally inflated market, and apprehensive of the optimistic plans American synthetic producers have to boost the capacity of their plants, are blaming market speculation for the high costs of crude rubber. This may be putting the cart before the horse, for it seems more likely that speculation is only the symptom of a condition, not the condition itself.

Returning to statistical details for the period under consideration, on the New York Commodity Exchange, sales for the second half of July were 33,760 tons, bringing the monthly figure to 56,470 tons. Sales during the first half of August were 46,140 tons, or 79,900 tons for the July 16-August 15 period. Near-September stocks began the period at 41.00¢ and had risen to 43.35¢ by August 15; a record 48.40¢ was achieved on August 4.

COMMODITY EXCHANGE
WEEK-END CLOSING PRICES

Futures	July 16	July 23	July 30	Aug. 6	Aug. 13
Sept.	40.15	42.30	45.00	48.00	44.75
Dec.	38.85	41.35	44.20	47.60	44.25
1956					
Mar.	36.85	40.40	43.25	46.60	43.10
May	35.60	39.40	42.20	45.55	42.00
July	34.10	38.15	41.20	44.45	41.05
Sept.	33.10	37.15	40.20	43.45	40.05
Total weekly sales, tons	13,740	16,340	17,420	21,460	18,840

On the physical market, R.S.S. #1 began the period at 41.13¢ a pound, shot to 48.13¢ by August 4, and declined with fluctuation to 43.75¢ by August 15.

July monthly average spot prices for representative grades follow: R.S.S. #1, 41.28¢; R.S.S. #3, 40.13¢; #3 Amber Blankets, 36.56¢; and Flat Bark, 34.33¢. For the first half of August, R.S.S. #1 averaged 46.34¢.

NEW YORK SPOT MARKET
WEEK-END CLOSING PRICES

	July 16	July 23	July 30	Aug. 6	Aug. 13
R.S.S.: #1	40.38	42.38	45.13	47.75	45.38
2	39.88	41.88	44.63	47.25	45.13
3	39.13	41.38	44.13	46.75	44.88
Latex crepe #1 Thick	42.50	44.00	45.88	48.75	47.38
Thin	42.50	44.00	45.88	48.75	47.38
#3 Amber Blankets	35.38	37.50	39.25	41.00	38.88
Thin Brown Crepe	35.13	37.25	39.00	40.50	38.63
Flat Bark	34.13	34.88	38.00	37.75	35.50

Latex

Activity in *Hevea* and synthetic latices during the period from July 16 to August 15 was typically quiet for mid-summer, with renewed activity expected to start shortly. The stock position was seen to be somewhat more favorable than during the past few months because of production slowdown, but observers were by no means optimistic about the supply situation for the fall and winter periods. Much was said to depend upon consumer acceptance of 1956 automotive models. If these models create an automotive boom equal to or greater than that of 1955, the current latex stock picture is indeed ominous.

Prices of *Hevea* latex during the period were slightly higher than last month's, being tied to some degree to the spectacular price rise in the natural rubber market. An average quotation of 42-2/3¢ per pound solids was in evidence. Prices of synthetic rubber latices were mostly the same as last month's: namely, GR-S, 26-32.3¢; neoprene, 37-47¢; and N-Type, 46-54¢ per pound total dry solids in rail-tank cars, f.o.b. producing plant.

Final May and preliminary June domestic statistics for latices follow:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
May	0	8,849	6,643	8,854
June	0	....	6,842	8,974
GR-S				
May	5,237	55	4,728	7,021
June	4,635	53	4,529	6,596
Neoprene				
May	880	0	768	767
June	905	0	789	749
Nitrile				
May	808	0	493	817
June	1,434	0	592	832

Synthetic Rubber

Long before the government-owned synthetic rubber plants were sold to private industry, business and industrial leaders were freely predicting that the absorption of the industry into the free enterprise system would prove of enormous benefit to the American economy. It is now apparent that these predictions were, if anything, not optimistic enough. Not only have these few short months seen the establishment of record peacetime levels of synthetic production, but grandiose plans to boost output still further are already in the first stage of fulfillment.

William I. Burt, president, Goodrich-Gulf Chemicals, Inc., recently revealed that American synthetic rubber production in May and June, the first two months of private ownership, amounted to about 160,300 long tons, 73% higher than in the similar period of 1954, and the highest production rate since the Korean hostilities. Except for the months of April and May, 1953, the figure was also the highest since World War II.

The May-June, 1955, production level was achieved despite the fact that the Institute, W. Va., facilities, rated at an annual capacity of 122,000 long tons, are in standby condition and not operating, Mr. Burt said. Since the May-June, 1953, total output was 168,254 long tons, including the Institute output, it seems fairly certain that once the Institute facilities are in full operation, all-time record levels of synthetic production in the United States will be reached.

In tune with this optimistic thinking is the recent announcement by Harvey S. Firestone, Jr., chairman of the board of The Firestone Tire & Rubber Co., that his company's Lake Charles, La., plant will

are TACKY compounds

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Here's how you can eliminate tack and get added benefits as well.

Use Polymel DX as a plasticizer in proportions ranging from 5 to 35 parts on the rubber and processing problems resulting from tackiness will usually disappear.

In addition, POLYMEL DX gives . . .

- **Good Mold Flow**
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- **Fine Surface Finish**
- **Good Retention of Outline**
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POLYMEL DX is a low-cost styrene copolymer resin available in either powder or 2" lump form. If you have not yet investigated this unusual material, write today for a generous sample.

Prices fob Baltimore		
	1 drum to 4900 lbs.	—.1475¢ lb.
	5000 lbs. to truckloads	—.1425¢ lb.
	Truckloads	—.1375¢ lb.

THE POLYMEL CORPORATION

MANUFACTURERS OF
compounding ingredients for reinforcing, plasticizing, extending and processing natural and synthetic elastomers.

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produce about 30% more synthetic during the last half of 1955 than was produced during the first half of the year. The expansion currently underway there will enable the plant by December to produce at the rate of 150,000 tons of rubber annually, Mr. Firestone revealed. This figure represents an increase of 50% above the plant's rated capacity when it was purchased from the government last April. Capacity of the plant in July was already up to a 123,000-ton annual rate. Only 63,000 tons of rubber were produced at the facilities in 1954 under government sponsorship.

Even more ambitious are the expansion plans announced by Paul W. Litchfield, board chairman of The Goodyear Tire & Rubber Co., to bring the annual capacity of his company's Houston, Tex., plant to an eventual 200,000 long tons. First stage in the $6,000,000 program will be completed by 1957 and will boost the plant output from its current 137,500 tons to 170,000 tons, making the facility the largest in the world. Deadline for the completion of the project has not been set. Annual rated capacity of the plant at the time of transfer from government ownership was 99,600 tons.

What Firestone and Goodyear are doing with its facilities is typical of the rest of the industry. American and world demand, as well as consumption, are at record levels and still climbing, and as long as such incentive exists, U. S. industrialists feel sure that American investment capital can meet the challenge. Expansion is the keynote for this month's synthetic rubber picture.

Despite the unprecedented demand for both synthetic and natural rubbers and the high natural rubber price, producers of GR-S types are still holding the price line at about the pre-disposal level.

Scrap Rubber

There was little activity on the scrap rubber market during the period from July 16 to August 15 as many reclaimers, including Naugatuck, shut their plants for their annual vacations. At the period-end, signs of renewed business were evident mostly in mixed auto tires and tubes.

According to the Bureau of the Census, United States Department of Commerce, April exports of scrap rubber rose to 3,502,808 pounds, valued at $143,990, from 1,113,170 pounds, worth $53,729, in March. April shipments included 1,588,315 pounds to Spain, 624,628 pounds to Western Germany, 146,821 pounds to Canada, 128,183 pounds to Japan, and 101,200 pounds to the Netherlands.

April imports totaled 1,088,687 pounds, value $40,228, as compared to the 2,510,814 pounds, worth $125,067, for March.

Mixed auto tires rose about $1 a ton at both Eastern and Western points over last month's quotations, as did No. 1 Peelings. Other increases were recorded for mixed auto tires, black passenger tubes, and red passenger tubes.

Current dealers' buying prices for scrap rubber grades, in carload lots delivered to mills at the points indicated, follow:

	Eastern Points (Per Net Ton)	Akron, O. (Per Net Ton)
Mixed auto tires	$12.00/14.00	$14.00
S. A. G. auto tires	Nom.	13.00
Truck tires	Nom.	14.00
Peelings, No. 1	41.00/42.00	41.00/42.00
2	24.00	24.00
3	15.50	Nom.
Tire buffing	17.00	14.00/15.00
	(¢ per Lb.)	
Auto tubes, mixed	4.50	4.50
Black	5.25/5.50	5.25/5.50
Red	7.00	7.00
Butyl	6.00/6.50	6.25/6.50

Reclaimed Rubber

The reclaimed rubber market subsided into the traditional summer lull during the period from July 16 to August 15, but producers expected a momentary pickup.

Reclaimed rubber exports during April amounted to 2,436,914 pounds, valued at $221,467, or 480 pounds more than the March exports of 2,436,434 pounds, worth $210,797.

Imports during April totaled 311,115 pounds, value $16,751; no import figures were available for March. February imports had amounted to 250,000 pounds, worth $8,513.

No change was reported in the domestic reclaim price structure.

RECLAIMED RUBBER PRICES

	Lb.
Whole tire: first line	$0.10
Fourth line	.0875
Inner tube: black	.15
Red	.21
Butyl	.15
Pure gum, light colored	.23
Mechanical, light colored	.135

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Cotton Fabrics

Trading was mostly sluggish on the industrial fabrics market during the period from July 16 to August 15, a business lull typical of this time of year. A drop in production levels sustained the generally tight position in such industrial fabrics as wide sheetings, wide drills, sateens, broken twills, and enameling ducks which has characterized the market in recent months.

Nevertheless observers were optimistic about the situation ahead, predicting continued vigorous demand for industrial fabrics and a high production level commensurate with the rest of the nation's industry, now enjoying a boom. Not even the surprisingly high cotton estimate of 12,788,000 bales released by the U. S. Department of Agriculture is expected to dim permanently demand for cotton textiles. The auto industry, especially, will prove a spur to all facets of the market.

Although prices remained mostly firm during the monthly period just concluded, the increase in wages that most industrial fabric mills have already given their employes in advance of the new one-dollar-an-hour minimum wage law is expected to cause upward revision of prices soon.

Period-end prices follow:

COTTON FABRICS

Drills		
59-inch 1.85 yd.	*yd.*	$0.385
2.25-yd.		.3275/$0.33
Ducks		
38-inch 1.78-yd. S.F.	*yd.*	nom.
2.00-yd. D.F.		nom.
51.5-inch, 1.35-yd. S.F.		nom.
Hose and belting		.67
Raincoat Fabrics		
Printcloth, 38½-inch, 64x60, 5.35-yd	*yd.*	.1425
6.25 yd.		.12
Sheeting, 48-inch, 4.17-yd.		.20
52-inch, 3.85-yd.		.22
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.255
3.65-yd.		.16
Chafer Fabrics		
14.40-oz./sq. yd. Pl.	*yd.*	.70
11.65-oz./sq. yd. S.		.61
10.80-oz./sq. yd. S.		.6575
8.9-oz./sq. yd. S.		.67
Other Fabrics		
Headlining, 59-inch, 1.65-yd., 2-ply	*yd.*	.465
64-inch, 1.25-yd., 2-ply		.595
Sateens, 53-inch, 1.32-yd.		.56
58-inch, 1.21-yd.		.61

Rayon

Total calculated production of rayon and acetate yarn during July was 69,200,000 pounds, of which 34,500,000 pounds were regular-tenacity yarn and 34,700,000 were high-tenacity yarn. Total shipments for July were 66,500,000 pounds, of which 30,900,000 pounds were regular-tenacity yarn, and 35,600,000 pounds were high-tenacity yarn. Month-end stocks were as follows: total yarn, 46,300,000 pounds; regular-tenacity yarn, 42,000,000 pounds; and high-tenacity yarn, 4,300,000 pounds. Figures for both production and shipments were somewhat below June's totals. Stocks of total yarn were above the June figure of which high tenacity stocks, however, were slightly below June's.

Prices per pound of rayon tire yarns and fabrics were unchanged.

RAYON PRICES

Tire Yarns	
High Tenacity	
1100/ 480	$0.62
1100/ 490	.62
1150/ 490	.62
1165/ 480	.63
1230/ 490	.62
1650/ 720	.61
1650/ 980	.61
1875/ 980	.61
2200/ 960	.60
2200/ 980	.60
2200/1466	.67
4400/2934	.63
Super-High-Tenacity	
1650/ 720	.64
1900/ 720	.64
Tire Fabrics	
1100/490/2	0.72
1650/980/2	.695 / $0.73
2200/980/2	.685

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Reply with resume, salary requirements and location preference to BOX 1769, c/o RUBBER WORLD

RUBBER COMPOUNDING RESEARCH

PhD or equivalent for responsible position as manager of a Rubber Compounding Research Laboratory. Opportunity for fundamental work on new synthetic rubbers and reinforcing agents—integrated with an aggressive research and development program on synthetic rubber, including pilot plant and tire testing facilities. Send résumé to Box No. 1771, c/o RUBBER WORLD.

CHEMIST

Graduate coating chemist acquainted with the formulation of coatings, familiar with coating techniques and the operation of various types of coating equipment, and whose chemical knowledge and background include vinylite and neoprene coatings. For research and development work with large New Jersey Manufacturer. Kindly address letter, giving full details to box No. 1772, c/o RUBBER WORLD.

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FIVE TO TEN YEARS' RUBBER EXPERIENCE
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Experienced Chemist, Physicist, or Chemical Engineer to conduct Elastomer and Plastics research. Emphasis will be basic research. Experience in the fields of reinforcing pigments and fillers is desirable.

Pension, Group Life, Hospital and Surgical plans are offered. Salary commensurate with background and experience. Please submit complete, confidential resumé, including salary requirements, to:

Godfrey L. Cabot, Inc.
Research and Development Laboratory
38 Memorial Drive
Cambridge 42, Massachusetts
Att: Personnel Director

RUBBER TECHNOLOGIST

College graduate having Chemistry, Physics or Chemical Engineering major to assist in organizing rubber compounding studies, data, and to write laboratory reports. Some experience in the rubber and plastics field is required.

Pension, Group Life, Hospital and Surgical plans are offered. Salary commensurate with background and experience. Please submit complete, confidential resumé, including salary requirements, to:

Godfrey L. Cabot, Inc.
Research and Development Laboratory
38 Memorial Drive
Cambridge 42, Massachusetts
Att: Personnel Director

COMPOUNDING INGREDIENTS*

Abrasives

Pumicestone, powdered	lb.	$0.025 /	$0.045
Rottenstone, domestic	lb.	.03 /	.04
Shelblast	ton	80.00 /	165.00
Walnut Shell Grits	ton	50.00 /	160.00

Accelerators

A-1 (Thiocarbanilide)	lb.	.50 /	.57
A-32	lb.	.66 /	.80
A-100	lb.	.52 /	.66
Accelerator 49	lb.	.55 /	.56
108	lb.	.90	
552	lb.	2.25	
808	lb.	.66 /	.68
833	lb.	1.17 /	1.19
Altax	lb.	.50 /	.52
Arazate	lb.	2.25	
Beutene	lb.	.66 /	.71
Bismate	lb.	3.00	
B-J-F	lb.	.27 /	.32
Butasan	lb.	1.04	
Butazate	lb.	1.04	
Butyl Accelerator 21	lb.	.89	
Eight	lb.	1.10 /	1.35
Zimate	lb.	1.04	
Captax	lb.	.40 /	.42
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Diesterex N	lb.	.50 /	.57
DOTG (diorthotolylguanidine)			
Cyanamid	lb.	.60 /	.61
Du Pont	lb.	.57 /	.58
DPG (diphenylguanidine)			
Cyanamid	lb.	.50 /	.51
Monsanto	lb.	.48 /	.55
El-Sixty	lb.	.58 /	.65
Ethasan	lb.	1.04	
Ethazate	lb.	1.04	
50-D	lb.	.85	
Ethyl Thiurad	lb.	1.04	
Tuads	lb.	1.04	
Tuex	lb.	1.04	
Zimate	lb.	1.04	
Ethylac	lb.	.93 /	.95
Hepteen	lb.	.44 /	.50
Base	lb.	1.85	
Ledate	lb.	1.04	
MBT (2-mercaptobenzothiazole)			
American Cyanamid	lb.	.40 /	.42
Du Pont	lb.	.38 /	.40
Naugatuck	lb.	.40 /	.45
-XXX, Cyanamid	lb.	.51 /	.53
MBTS (mercaptobenzothiazyl disulfide)			
Cyanamid	lb.	.50 /	.52
Du Pont	lb.	.48 /	.50
Naugatuck	lb.	.50 /	.55
-W Cyanamid	lb.	.53 /	.55
Mertax	lb.	.51 /	.58
Methasan	lb.	1.04	
Methazate	lb.	1.04	
Methyl Tuads	lb.	1.14	
Zimate	lb.	1.04	
Monex	lb.	1.14	
Mono-Thiurad	lb.	1.14	
Morfex	lb.	.65 /	.70
MT	lb.	1.00	
NOBS No. 1	lb.	.72 /	.74
Special	lb.	.77 /	.79
O-X-A-F	lb.	.51 /	.56
Pentex	lb.	1.04	
Flour	lb.	.21	
Permalux	lb.	2.17	
Phenex	lb.	.52 /	.59
Pip-Pip	lb.	2.07	
R-2 Crystals	lb.	4.35	
Rotax	lb.	.51 /	.53
RZ-50, -50B	lb.	1.00	
S. A. 52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	2.50	
Santocure	lb.	.72 /	.79
NS	lb.	.78 /	.85
Selenacs	lb.	2.60	
SPDX-GH	lb.	.69 /	.74
GL	lb.	1.20 /	1.34
Tellurac	lb.	1.21	
Tepidone	lb.	.45	
Tetrone A	lb.	1.91	
Thiofide	lb.	.50 /	.57
S	lb.	.52 /	.59
Thionex	lb.	1.14	
Thiotax	lb.	.40 /	.47
Thiurad	lb.	1.14	
Thiuram E	lb.	1.04	
M	lb.	1.14	
Trimene	lb.	.56 /	.62
Base	lb.	1.03 /	1.10
Tuex	lb.	1.14	
Ultex	lb.	1.00 /	1.10
Unads	lb.	1.14	
Ureka Base	lb.	.66 /	.73
Vulcacure NB	lb.	.45	
ZB, ZE, ZM	lb.	.85	
Z-B-X	lb.	2.45 /	
Zenite	lb.	.48 /	.50
A	lb.	.49 /	.51
Special	lb.	.49 /	.51

* Prices, in general, are f.o.b. works. Range indicates grade or quantity variations. No guarantee of these prices is made. Spot prices should be obtained from individual suppliers.

† For trade names, see Color—White, Zinc Oxides.

Zetax	lb.	$0.51 /	$0.53
Zimate	lb.	1.04	

Accelerator-Activators, Inorganic

Lime, hydrated	ton	20.21	
Litharge, comml.	lb.	.165 /	.17
Eagle, sublimed	lb.	.171	
National Lead, sublimed	lb.	.17 /	.18
Red lead, comml.	lb.	.175 /	.1925
Eagle	lb.	.18	
National Lead	lb.	.18 /	.1925
White lead, carbonate	lb.	.165 /	.175
Eagle	lb.	.165 /	.175
National Lead	lb.	.175 /	.185
Silicate	lb.	.16 /	.1925
Eagle	lb.	.175 /	.1925
National Lead	lb.	.16 /	.18
Zinc oxide, comml.†	lb.	.135 /	.1775

Accelerator-Activators, Organic

Aktone	lb.	.22 /	.23
Barak	lb.	.62	
Capital 170	lb.	.2275 /	.2675
171	lb.	.1325 /	.1725
700, 701	lb.	.155 /	.195
705, 710	lb.	.155 /	.195
800	lb.	.12 /	.14
801	lb.	.1375 /	.1575
802	lb.	.1425 /	.1625
803	lb.	.165 /	.185
Curade	lb.	.57 /	.59
D-B-A	lb.	1.95	
Emery 600	lb.	.1325 /	.1725
Groco 30	lb.	.1325 /	.1725
35	lb.	.1375 /	.1775
Guantal	lb.	.57 /	.64
Hyfac 400	lb.	.1138 /	.1400
430	lb.	.1563 /	.1825
431	lb.	.1788 /	.205
Hystrene S-97	lb.	.1863 /	.2125
T-45	lb.	.1638 /	.19
T-70	lb.	.1738 /	.20
Industrene B	lb.	.1263 /	.1525
R	lb.	.1138 /	.14
158	lb.	.1313 /	.1575
254	lb.	.1413 /	.1675
262	lb.	.1513 /	.1775
Laurex	lb.	.33 /	.37
MODX	lb.	.295 /	.345
NA-22	lb.	1.50	
Oleic acid, comml.	lb.	.155 /	.195
Emersol 210 Elaine	lb.	.16 /	.20
Groco 2, 4, 8, 18	lb.	.16 /	.20
Plastone	lb.	.27 /	.30
Polyac	lb.	1.65	
Ridacto	lb.	.25 /	.26
Seedine	lb.	.1485 /	.1703
Stearex Beads	lb.	.1488 /	.1588
Stearic acid			
Emersol 120	lb.	.1413 /	.1675
130	lb.	.1638 /	.19
Hydrofol 51	lb.	.09	
Hydrogenated, rubber grd.			
Groco	lb.	.12 /	.14
Rufat 75	lb.	.1138 /	.14
Single pressed, comml.	lb.	.1375 /	.1575
Emersol 110	lb.	.1363 /	.1625
Groco 53	lb.	.1425 /	.1625
Wilmar 253	lb.	.1363 /	.1625
Double pressed, comml.	lb.	.1425 /	.1625
Groco 54	lb.	.1475 /	.1675
Wilmar 254	lb.	.1413 /	.1675
Triple pressed, comml.	lb.	.165 /	.185
Groco 55	lb.	.17 /	.19
Wilmar 255	lb.	.1638 /	.19
Sterene 60-R	lb.	.09 /	.1075
Tonox	lb.	.515 /	.605
Vulklor	lb.	.88 /	1.08
Wilmar 110	lb.	.16 /	.20
434	lb.	.1325 /	.1725
Zinc stearate, comml.	lb.	.37 /	.42

Antioxidants

AgeBest A26	lb.	.18 /	.24
620-32B	lb.	.20 /	.26
716-30	lb.	.18 /	.24
1041-21	lb.	.165 /	.225
1293-22A	lb.	1.90 /	2.00
AgeRite Alba	lb.	2.35 /	2.45
Gel	lb.	.64 /	.66
H. P.	lb.	.72 /	.74
Hipar	lb.	.98 /	1.00
Powder	lb.	.52 /	.54
Resin	lb.	.75 /	.77
D	lb.	.52 /	.54
Spar	lb.	.52 /	.54
Stalite	lb.	.52 /	.54
S	lb.	.52 /	.54
White	lb.	1.45 /	1.55
Akroflex C	lb.	.77 /	.79
CD	lb.	.72 /	.74
Albasan	lb.	.69 /	.73
Allied AA-1144	lb.	.23 /	.24
AA-1177	lb.	.155 /	.165
Aminox	lb.	.52 /	.57
Antioxidant 425	lb.	2.47 /	2.50
2246	lb.	1.50 /	1.53
Antisol	lb.	.23 /	.24
Antisun	lb.	.15 /	.175
Antox	lb.	.52 /	.54
Aranox	lb.	3.25	
Betanox Special	lb.	.80 /	.85
B-L-E, -25	lb.	$0.52 /	$0.57
Burgess Antisun Wax	lb.	.185	
B-X-A	lb.	.52 /	.57
Copper Inhibiter X-872-L	lb.	2.01	
D-B-P-C	lb.	.91 /	1.16
Flectol H	lb.	.52 /	.59
Flexamine	lb.	.72 /	.77
Heliozone	lb.	.26 /	.27
Ionol	lb.	.91 /	1.40
NBC	lb.	1.55	
Neozone A	lb.	.56 /	.58
D	lb.	.52 /	.54
Octamine	lb.	.52 /	.57
PDA-10	lb.	.46 /	.48
Perflectol	lb.	.61 /	.68
Polygard	lb.	.52 /	.57
Protector	lb.	.26 /	.31
Rio Resin	lb.	.60 /	.62
Santoflex 35	lb.	.72 /	.79
75	lb.	.92 /	.99
AW	lb.	.78 /	.85
B	lb.	.52 /	.59
BX	lb.	.63 /	.70
DD	lb.	.52 /	.59
Santovar A	lb.	1.50 /	1.57
Santowhite Crystals, Powder	lb.	1.60 /	1.67
L	lb.	.52 /	.59
MK	lb.	1.29 /	1.36
Sharples Wax	lb.	.23 /	.28
Stabilite	lb.	.55 /	.59
Alba	lb.	.72 /	.79
L	lb.	.60 /	.64
White	lb.	.52 /	.60
Powder	lb.	.41 /	.47
Styphen I	lb.	.51 /	.55
Sunolite #100	lb.	.21 /	.23
#127	lb.	.17 /	.19
Sunproof -713	lb.	.25 /	.30
Improved	lb.	.25 /	.30
Jr.	lb.	.20 /	.25
Thermoflex A	lb.	.98 /	1.00
Tonox	lb.	.52 /	.57
Tysonite	lb.	.24 /	.2475
Velvapex 51-250	lb.	.40	
V-G-B	lb.	.70 /	.75
Wing-Stay S	lb.	.52 /	.61
Zenite	lb.	.48 /	.50

Antiseptics

Copper naphthenate, 6-8%	lb.	.24	
Pentachlorophenol	lb.	.21 /	.29
Resorcinol, technical	lb.	.775 /	.785
Zinc naphthenate, 8-10%	lb.	.245 /	.30

Blowing Agents

Ammonium bicarbonate	lb.	.065 /	.085
Carbonate	lb.	.16	
Blowing Agent CP-975	lb.	.35	
Celogen	lb.	1.95	
50-C	lb.	1.01 /	1.07
Sodium bicarbonate	100 lbs.	2.70 /	3.30
Carbonate, tech	100 lbs.	1.35 /	5.52
Sponge Paste	lb.	.20	
Unicel	lb.	.90	
ND	lb.	.76	
S	lb.	.20	

Bonding Agents

Braze	gal.	6.00 /	9.00
Cover cement	gal.	2.50 /	4.00
Flocking Adhesive RFA17, RFA22, RFA25	lb.	.50	
G-E Silicone Paste SS-15	lb.	4.52 /	5.10
SS-64	lb.	3.65 /	6.75
-67 Primer	lb.	7.50 /	12.50
Gen-Tac Latex	lb.	.75 /	.855
Kalabond Adhesive	gal.	6.50 /	16.00
Tie Cement	gal.	2.00 /	5.60
MDI	lb.	4.00 /	6.00
-50	lb.	2.00 /	3.00
Thixons	gal.	1.48 /	12.00
Ty Ply BN, Q, S, UP, 3640	gal.	6.75 /	8.00
RC	gal.	3.75 /	5.00

Brake Lining Saturants

BRT 3	lb.	.018 /	.0265
Resinex L-S	lb.	.0225 /	.03

Carbon Blacks‡

Conductive Channel—CC

Continental R-40	lb.	.23 /	.30
Kosmos/Dixie BB	lb.	.23 /	.30
Spheron C	lb.	.14 /	.185
Voltex	lb.	.18 /	.315

Easy Processing Channel—EPC

Continental AA	lb.	.074 /	.1225
Kosmobile 77/Dixiedensed 77	lb.	.074 /	.1225
Micronex W-6	lb.	.074 /	.1225
Spheron #9	lb.	.074 /	.1225
Texas E	lb.	.074 /	.1225
Witco #12	lb.	.074 /	.1225
Wyex	lb.	.074 /	.12

Hard Processing Channel—HPC

Continental F	lb.	.074 /	.1225
HX	lb.	.074 /	.12

‡ At the request of the suppliers, the lowest prices shown for carbon blacks are for carloads in bags. Prices for hopper carloads are lower.

SITUATIONS OPEN (Continued)

RUBBER AND PLASTICS

Rubber Chemists, sponge experience desirable, plant or laboratory. Rubber Chemists, general compounding and plant experience desirable. Plastics Chemists or Engineers, laboratory and plant experience desirable. Quality Control Supervisor, capable of installing new department. Expanding Operation. Opportunities for Advancement. Salaries open. Details on request. Write: Dale A. Dougherty, Assistant to the President, O'SULLIVAN RUBBER CORPORATION, Box 603, Winchester, Virginia.

CHIEF LATEX CHEMIST TO DIRECT SOUTHERN MANUfacturing division of latex compounds for textile industry. Must be tops on compound experience and development. Excellent opportunity in established growing concern. State fully qualifications and requirements. Address Box No. 1773, care of RUBBER WORLD.

RUBBER CHEMISTS

Degree in chemistry or chemical engineering. Up to five years' experience in rubber and polymer processing, development or production. Progressive company, well-equipped laboratory; permanent position with opportunity for advancement in expanding operation. Write giving age, experience, and education. Replies held confidential. Address Box 369, Erie, Pennsylvania.

LATEX CHEMIST. CONTROL AND DEVELOPMENT. LEADING eventually to field sales. Excellent opportunity in Philadelphia area. Send complete résumé for personal interview to: THE CLARKSON LABORATORIES, 919-23 N. Ninth Street, Philadelphia 23, Pa.

TECHNICAL RUBBER AND VINYL MAN WITH PRACTICAL process experience in resilient flooring by National Manufacturer. State salary required. Address Box No. 1774, care of RUBBER WORLD.

PLANT SUPERINTENDENT WITH THOROUGH KNOWLEDGE of rubber molded and lathe-cut production methods. Must be able to train pressmen and coordinate production. Should know equipment and molds. Excellent opportunity for aggressive man with medium-sized expanding company. Write RADIATOR SPECIALTY CO., Charlotte, N. C.

WANTED

MANUFACTURER'S AGENT for line of Neoprene and Hypalon protective coatings. Eastern seaboard and midwestern states. Address Box 1781, care of RUBBER WORLD.

LATEX CHEMIST: EXCELLENT OPENING WITH A FUTURE for a development Chemist. One to do research and field work on Synthetic and Natural Latices for textile applications. Well-established firm. We would appreciate receiving a résumé of your experience in detail. Address Box No. 1782, care of RUBBER WORLD.

LATEX FOAM PRODUCTION MANAGER

Large, well-financed company is looking for a man with extensive experience in latex foam production. Man selected will have complete charge of plant. Excellent salary. Address Box No. 1783, care of RUBBER WORLD.

SITUATIONS WANTED

TECHNICAL DIRECTOR-FACTORY MANAGER—B.Sc., LL.B.—18 years' experience in development, production, management, and administration in all phases of the rubber industry. Seeks management level position as Technical Director, Factory Manager, or equivalent. Address Box No. 1775, care of RUBBER WORLD.

PROJECT ENGINEER: WIDE VARIETY OF ENGINEERING backgound, mechanical & electronic. Good on design and tooling for production. Proven record as administrator. Address Box No. 1776, care of RUBBER WORLD.

ORGANIC-LATEX CHEMIST-A.B.-M.S. SEVERAL YEARS' EXPErience, compounding, research, and control of latex foam. Also one-year experience as inorganic chemist. Twenty-eight years old and willing to relocate. Now employed, but would like position with broader horizons. Address Box No. 1780, care of RUBBER WORLD.

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FARREL 16″ X 48″ AND 15″ X 36″ 2-ROLL RUBBER MILLS and sizes up to 84″. New and used lab. 6″ x 12″ & 6″ x 16″ Mills and Calenders. Extruders 1″ to 6″. Baker-Perkins Jacketed Mixers 100, 50, and 9 gals. HPM 200-ton Hydr. Press 30″ x 48″ platens. Brunswick 200-ton 21″ x 21″ platens. 150-ton, 20″ x 20″ platens. Large stock Hydraulic Presses 12″ x 12″ to 48″ x 48″ platens. Hydraulic Pumps and Accumulators. Rotary Cutters. Stokes Molding Presses. Single-Punch & Rotary Preform Machines. Banbury Mixers, Crushers, Churns. Bale Cutters, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT CO., 107-8th St., Brooklyn 15, N. Y. STerling 8-1944.

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Kosmobile S/Dixiedensed S	lb.	$0.074 /	$0.1225
Micronex Mk. II	lb.	.074 /	.1225
Spheron #4	lb.	.074 /	.1225
Witco #6	lb.	.074 /	.1225
Medium Processing Channel—MPC			
Arrow TX	lb.	.074 /	.12
Continental A	lb.	.074 /	.1225
Kosmobile S-66/Dixiedensed S-66	lb.	.074 /	.1225
Micronex Standard	lb.	.074 /	.1225
Spheron #6	lb.	.074 /	.1225
Texas 109	lb.	.079 /	.1275
M	lb.	.074 /	.1225
Witco #1	lb.	.074 /	.1225
Conductive Furnace—CF			
Aromex 115	lb.	.089 /	.129
Vulcan C	lb.	.105 /	.15
SC	lb.	.18 /	.223
Fast Extruding Furnace—FEF			
Arovel	lb.	.06 /	.10
Continex FEF	lb.	.06 /	.10
Kosmos 50/Dixie 50	lb.	.06 /	.10
Statex M	lb.	.06 /	.10
Sterling SO	lb.	.06 /	.10
Fine Furnace—FF			
Statex B	lb.	.065 /	.105
Sterling 99	lb.	.065 /	.105
High Abrasion Furnace—HAF			
Aromex	lb.	.079 /	.119
Continex HAF	lb.	.079 /	.125
Kosmos 60/Dixie 60	lb.	.079 /	.1175
Philblack O	lb.	.079 /	.119
Statex R	lb.	.079 /	.125
Vulcan #3	lb.	.079 /	.125
Intermediate Super Abrasion Furnace—ISAF			
Aromex 125	lb.	.10 /	.14
Kosmos 70/Dixie 70	lb.	.10 /	.145
Philblack I	lb.	.10 /	.145
Statex 125	lb.	.10 /	.145
Vulcan 6	lb.	.10 /	.145
Medium Abrasion Furnace—MAF			
Philblack A	lb.	.06 /	.10
Super Abrasion Furnace—SAF			
Philblack E	lb.	.125 /	.165
Vulcan 9	lb.	.125 /	.168
General-Purpose Furnace—GPF			
Arogen GPF	lb.	.05 /	.09
Sterling V	lb.	.05 /	.09
V Non-staining	lb.	.05 /	.09
High Modulus Furnace—HMF			
Continex HMF	lb.	.055 /	.095
Kosmos 40/Dixie 40	lb.	.055 /	.095
Modulex	lb.	.055 /	.095
Statex 93	lb.	.055 /	.095
930	lb.	.047 /	.087
Sterling L, LL	lb.	.055 /	.095
Semi-Reinforcing Furnace—SRF			
Continex SRF	lb.	.045 /	.085
Essex	lb.	.045 /	.085
Furnex	lb.	.0475 /	.0875
Gastex	lb.	.05 /	.09
Kosmos 20/Dixie 20	lb.	.045 /	.085
Pelletex, NS	lb.	.045 /	.085
Sterling NS, S	lb.	.045 /	.085
R	lb.	.05 /	.09
Fine Thermal—FT			
P-33	lb.	.055	
Sterling FT	lb.	.055	
Medium Thermal—MT			
Sterling MT	lb.	.04	
Non-staining	lb.	.05	
Thermax	lb.	.04	
Stainless	lb.	.05	

Colors

Black

Iron oxides, comml	lb.	.1275 /	.13
BK—Lansco	lb.	.1275 /	.13
Williams	lb.	.1325 /	.135
Lansco synthetic	lb.	.10	
Mapico	lb.	.1275 /	.13
Lampblack, comml	lb.	.16 /	.45
Superjet	lb.	.0825 /	.1175
Permanent Blue	lb.	.80 /	1.05
Stan-Tone	lb.	.45 /	1.20
Vansul masterbatch	lb.	.60 /	.65
Paste	lb.	.14 /	.15

Blue

Du Pont	lb.	1.77 /	4.55
Filo	lb.	.28	
Heveatex pastes	lb.	.80 /	1.45
Lansco ultramarines	lb.	.25 /	.28
Monsanto Blue 7	lb.	1.55	
11	lb.	3.45	
DPB-283	lb.	1.93	
S-11	lb.	2.05	
Permanent Blue	lb.	.80 /	1.05
Stan-Tone	lb.	1.55 /	1.60
Vansul masterbatch	lb.	.90 /	2.70

Brown

Filo	lb.	$0.13	
Iron oxides, comml	lb.	.1375 /	$0.14
Lansco synthetic	lb.	.125	
Mapico Brown	lb.	.1375 /	.14
Brown 422	lb.	.14	
Sienna, burnt, comml	lb.	.0425 /	.155
Williams	lb.	.11 /	.1725
Raw, comml	lb.	.045 /	.1325
Williams	lb.	.08 /	.1725
Umber, burnt, comml	lb.	.06 /	.07
Williams	lb.	.0675 /	.08
Raw, comml	lb.	.0625 /	.07
Williams	lb.	.07 /	.0825
Williams, Pure brown	lb.	.1425 /	.145
Vandyke	lb.	.12	
Mapico Tan 20	lb.	.2025 /	.205
Tan 15	lb.	.205	
Metallic brown	lb.	.045 /	.055
Vansul masterbatch	lb.	2.10 /	2.20

Green

Chrome	lb.	.19 /	.50
Chrome oxide	lb.	.3925 /	1.10
G-4099, -6099	lb.	.3925 /	.3975
GH-9869	lb.	1.00 /	1.15
9976	lb.	1.10 /	1.25
Green	lb.	.80 /	2.40
Du Pont	lb.	1.97 /	2.80
Filo	lb.	.40	
Heveatex pastes	lb.	.95 /	1.85
Lansco Toner	lb.	1.35	
Monsanto Green 3	lb.	2.75	
14	lb.	1.45	
17	lb.	3.95	
71205	lb.	1.35	
DGP	lb.	2.03	
S-17	lb.	2.25	
Stan-Tone	lb.	1.75 /	4.60
Vansul masterbatch	lb.	2.00 /	2.60

Orange

Du Pont	lb.	2.75	
Monsanto Orange 68187	lb.	2.90	
Stan-Tone	lb.	.70 /	3.35
Vansul masterbatch	lb.	2.00 /	2.60

Red

Antimony trisulfide	lb.	.285 /	.315
R. M. P. No. 3	lb.	.72	
Sulfur Free	lb.	.78	
Cadmium red lithopone	lb.	1.64 /	2.05
Cadmolith	lb.	1.72 /	2.20
Cyanamid	lb.	.85	
Du Pont	lb.	1.47 /	1.80
Filo	lb.	.11	
Indian Red	lb.	.1275	
Iron oxide, comml	lb.	.06 /	.13
Lansco synthetic	lb.	.1175	
Mapico	lb.	.1275 /	.13
Recco	lb.	.12	
Williams Red	lb.	.1275 /	.15
Monsanto Red 7	lb.	1.55	
41	lb.	4.40	
3501	lb.	1.15	
4004	lb.	1.50	
69191	lb.	3.38	
Autumn	lb.	1.10	
PRP-285	lb.	1.27	
S-44	lb.	1.28	
Maroon 113	lb.	1.50	
61148	lb.	1.75	
Rub-Er-Red	lb.	.0975	
Stan-Tone	lb.	.85 /	4.05
Tuscan	lb.	.15 /	.46
Vansul masterbatch	lb.	.95 /	3.30
Venetian	lb.	.035 /	.0625

White

Antimony oxide	lb.	.27 /	.305
Burgess Iceberg	ton	50.00 /	80.00
Cryptone BT	lb.	.10 /	.11
Permolith	lb.	.075 /	.085
Titanium pigments			
Rayox LW	lb.	.195 /	.205
R-110	lb.	.215 /	.225
Ti-Cal	lb.	.075 /	.0825
Ti-Pure	lb.	.195 /	.225
Titanox A, AA, A-168	lb.	.21 /	.22
C-50	lb.	.1225 /	.1275
RA, -10, -50	lb.	.23 /	.24
RC	lb.	.0825 /	.0875
-HT, -HTX	lb.	.08 /	.085
Unitane	lb.	.225 /	.255
Zopaque Anatase	lb.	.225 /	.235
Rutile	lb.	.245 /	.255
Zinc oxide, comml	lb.	.135 /	.1775
Azo ZZZ-11, -44, -55	lb.	.14 /	.16
20% leaded	lb.	.1435 /	.1635
35% leaded	lb.	.14625 /	.16625
50% leaded	lb.	.14875 /	.16875
Eagle AAA, lead free	lb.	.14 /	.15
5% leaded	lb.	.14 /	.15
35% leaded	lb.	.14625 /	.15625
50% leaded	lb.	.14875 /	.15875
Florence Green Seal	lb.	.1575 /	.1675
Red Seal	lb.	.1525 /	.1625
White Seal	lb.	.1625 /	.1725
Horsehead XX-4, -78	lb.	.135 /	.145
Kadox-15, -17, -72, -515	lb.	.14 /	.15
-25	lb.	.1625 /	.1725
Lehigh, 35% leaded	lb.	.14625 /	.15625
50% leaded	lb.	.14875 /	.15875
Protox-166, -167	lb.	.14 /	.15
St. Joe, lead free	lb.	.118 /	.16
Zinc sulfide, comml	lb.	.253 /	.263
Cryptone ZS	lb.	.253 /	.263

Yellow

Cadmium yellow lithopone	lb.	$1.15	
Cadmolith	lb.	1.12 /	$1.20
Du Pont	lb.	1.80 /	2.15
Filo	lb.	.10	
Iron oxide, comml	lb.	.0525 /	.1075
Lansco synthetic	lb.	.1075	
Mapico	lb.	.105 /	.1075
Williams	lb.	.11 /	.1175
Monsanto Yellow 14	lb.	1.91	
10010	lb.	1.91	
BYP-282	lb.	1.21	
GA	lb.	2.45	
S-10010	lb.	1.17	
Stan-Tone	lb.	1.00 /	1.55
Vansul masterbatch	lb.	.95 /	1.95
Williams Ocher	lb.	.0525 /	.055

Dusting Agents

Diatomaceous silica	ton	32.00 /	48.00
Extrud-o-Lube, conc	gal.	1.54 /	1.69
Glycerized Liquid Lubricant, concentrated	gal.	1.48 /	1.63
Latex-Lube GR	lb.	.20	
Pigmented	lb.	.1825	
R-66	lb.	.165	
Liqui-Lube	lb.	.1625	
N. T.	lb.	.1675	
Liquizinc No. 305	lb.	.30 /	.35
Lubrex	lb.	.25 /	.30
Mica Concord	lb.	.075 /	.0825
Mineralite	ton	45.00	
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Talc, comml	ton	18.40 /	38.50
EM	ton	11.00 /	63.00
LS Silver	ton	29.25	
Nytals	ton	25.00 /	36.00
Sierra Sagger 7	ton	34.00	
White IR	ton	19.75	
III	ton	20.75	
Vanfre	gal.	2.00 /	

Extenders

BRS 700	lb.	.02 /	.0285
BRT 7	lb.	.03 /	.031
Cumar Resins	lb.	.065 /	.17
Dielex B	lb.	.06	
Factice, Amberex	lb.	.29 /	.36
Brown	lb.	.1425 /	.268
Neophax	lb.	.157 /	.268
White	lb.	.144 /	.285
G.B. Asphaltenes	lb.	.06 /	.065
Millex, W	lb.	.07	
Mineral Rubbers			
Black Diamond	ton	38.00 /	40.00
Hard Hydrocarbon	ton	46.50 /	48.50
Hydrocarbon MR	ton	45.00 /	55.00
Parmr	ton	21.00 /	29.00
T-MR Granulated	ton	47.50 /	50.00
Nuba No. 1, 2	lb.	.0575 /	.0625
3X	lb.	.0775 /	.0825
OPD-101	lb.	.26	
Rubber substitute, brown	lb.	.1835 /	.2012
Car-Bel-Ex A	lb.	.14	
Car-Bel-Lite	lb.	.35	
Extender 600	lb.	.1765	
White	lb.	.148 /	.256
Stan-Shells	ton	35.00 /	73.00
Synthetic 100	lb.	.41	
Vistanex	lb.	.45 /	475

Fillers, Inert

Agrashell flour	ton	50.00 /	74.00
Barytes, floated, white	ton	41.60 /	60.10
Off-color, domestic	ton	25.00	
No. 1	ton	41.35 /	60.10
2	ton	39.35 /	58.00
Sparmite	ton	75.00 /	80.00
Blanc fixe	ton	100.00 /	165.00
Burgess Iceberg	ton	50.00 /	80.00
Pigment #20	ton	35.00 /	60.00
#30	ton	37.00 /	60.00
HC-75	ton	12.00 /	30.00
-80	ton	14.00 /	32.00
WP #1	ton	11.00 /	16.00
Cary #200	ton	30.00 /	55.00
Citrus seed meal	lb.	.04	
Oil	lb.	.15	
Clays, Aiken	ton	14.00	
Albacar	ton	50.00 /	55.00
Aluminum Flake	ton	20.00 /	60.00
#5	ton	23.50 /	30.00
Champion	ton	14.00	
Crown	ton	14.00 /	33.00
Dixie	ton	14.00	
Franklin	ton	13.50 /	35.25
GK Soft Clay	ton	11.00	
Hi-White R	ton	13.50	
Hydratex R	ton	28.00	
Kaolloid	ton	10.50	
Laminar	ton	30.00	
Paragon	ton	13.50 /	31.50
McNamee	ton	13.50	
RX-43	ton	33.00	
Recco	ton	14.00	
Sno-Brite	ton	12.50	
Stan-Clay	ton	28.00	
Stellar-R	ton	50.00	
Suprex	ton	14.00 /	32.00
Swanee	ton	12.50	
Windsor	ton	14.00 /	30.00
Diatomaceous silica	ton	32.00 /	48.00
Flocks			
Cotton, dark	lb.	.095 /	.135
Dyed	lb.	.55 /	.60
White	lb.	.13 /	.33

MACHINERY AND SUPPLIES FOR SALE (Continued)

FOR SALE: 2 FARREL 18" x 50" RUBBER MILLS; 1—18" x 48" 3-roll vertical calender; 1—24" x 24" multi-opening hydraulic press, 14" ram; 1 Thropp 6" x 16" lab mill; also vulcanizers, tubers, mills, mixers, etc. CHEMICAL & PROCESS MACHINERY CORP., 146 Grand Street, New York 13, N. Y.

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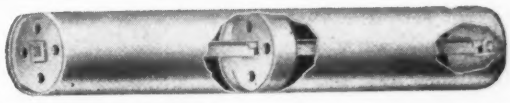

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Separating, Coloring

ROTEX RUBBER COMPANY, INC., 1-23 JABEZ ST., NEWARK 5, N. J. • TEL. MARKET 4-4444

Flocks—*(Cont'd)*		
Fabrifil X-24-G	lb.	$0.135
X-24-W	lb.	.235
Fiifloc 6000	lb.	.33
F-40-900	lb.	.135
HSC #35 Silicone Emulsion	lb.	1.36 / $3.50
Kalite	ton	50.00 / 65.00
Lithopone, commil	lb.	.075 / .085
Albalith	lb.	.075 / .085
Astrolith	lb.	.063⅝ / .0675
Eagle	lb.	.0725 / .075
Sunolith	lb.	.075 / .0825
Mica Concord	lb.	.075 / .0825
Millical	ton	35.00 / 50.00
Mineralite	ton	40.00 / 60.00
Non-Fer-Al	ton	30.00 / 45.00
Purecal	ton	56.75 / 71.75
Pyrax A	ton	13.50
W. A	ton	16.00
Sawdust	ton	14.00 / 35.00
Stan-White	ton	8.50 / 9.45
Super-White Silica	ton	23.00 / 43.00
Suspenso	ton	33.00 / 48.00
Ti-Cal	lb.	.0675
Valron estersil	lb.	1.00
Whiting, limestone		
Atomite	ton	30.00
Calcite	ton	21.50
Keystone	ton	16.00
Omya	ton	30.00
Paxinosa	ton	10.00 / 18.00
Snowflake	ton	17.00 / 18.00
Stonelite	ton	9.00
Witco	ton	8.50
York	ton	9.50

Finishes

Apex Bright Finish #5200-E	lb.	.25
Rubber Finish	gal.	2.50
Black-out	gal.	4.50 / 8.00
Flocks, Rayon, colored	lb.	.90 / 1.50
White	lb.	.75 / 1.25
Also see Flocks, under Fillers, Inert		
Rubber lacquer, clear	gal.	1.00 / 2.00
Shellacs, Angelo	lb.	.485 / .7325
Vac Dry	lb.	.485 / .57
Talc *(See Talc, under Dusting Agents)*		
Unidip	lb.	.15 / .20
Wax, Bees	lb.	.64 / .76
Carnauba	lb.	.56 / 1.03
Montan	lb.	.30 / .32
No. 118, colors	gal.	.86 / 1.41
Neutral	gal.	.76 / 1.31
Van Wax	gal.	1.45 / 1.50

Latex Compounding Ingredients

Acintol D, DLR	lb.	.06 / .075
FA #1	lb.	.065 / .08
#2	lb.	.075 / .09
Accelerator 552	lb.	2.25
J-117, -302	lb.	1.00 / 1.15
-144	lb.	.15 / .30
-307	lb.	1.10 / 1.25
-311	lb.	.60 / .75
Aerosol, dry types	lb.	.39 / 1.20
Liquid types	lb.	.40 / .72
Alcogum AN-6	lb.	.05
AN-10	lb.	.085
Alrosol	lb.	.41
Alrowet D-75	lb.	.63
Amberex solutions	lb.	.1675 / .18
Antifoam J-114	lb.	3.25 / 3.45
P-242	lb.	.24 / .35
Antioxidant J-137, -140	lb.	.55 / .70
-139, -293	lb.	1.45 / 1.60
-182	lb.	2.00 / 2.15
-186	lb.	1.40 / 1.55
2246	lb.	1.50 / 1.53
Anti-Webbing Agent J-183	lb.	.75 / .90
-297	lb.	.27 / .40
Aquablak B	lb.	.0925 / .0975
G	lb.	.105 / .11
K	lb.	.1075 / .1125
M	lb.	.085 / .09
Aquarex D	lb.	.78
G	lb.	.21
L, ME	lb.	.94
MDL	lb.	.33
NS	lb.	.60
SMO	lb.	.50
WAQ	lb.	.23
Areskap 50	lb.	.30 / .38
100, dry	lb.	.60 / .72
Aresket 240	lb.	.30 / .38
300, dry	lb.	.60 / .72
Aresklene 375	lb.	.42 / .57
Ben-A-Gels	lb.	.98 / 1.40
Bentone 18, 18C	lb.	.45
34	lb.	.60
Casein	lb.	.22
Cellosize WP-09, -3, -300	lb.	1.36 / 1.60
CW-12	lb.	.85
37	lb.	.70
Defoama W-1701	lb.	.125
Defoamer 115a	lb.	.50
Dispersing Agents		
Blancol	lb.	.1525 / .26
N	lb.	.155 / .26
Darvan Nos. 1, 2, 3	lb.	.22 / .30
Daxad 11, 21, 23, 27	lb.	.08 / .30
Dispersaid H7A	lb.	.58
1159	lb.	.43
Emulphor ON-870	lb.	.50 / .70
Igepal CO-630	lb.	.2875 / .47
Igepon T-73	lb.	$0.285 / $0.495
T-77	lb.	.45 / .69
Indulins	lb.	.06 / .08
Kreelons	lb.	.132 / .155
Laurelton Oil	lb.	.18
Leonil SA	lb.	$0.52 / $0.65
Lomar PW	lb.	.18
Marasperse CB	lb.	.1225 / .1425
N	lb.	.095 / .105
Modicols	lb.	.17 / .58
Nekal BA-75	lb.	.395 / .54
BX-76	lb.	.63 / .75
Pluronics	lb.	.335 / .40
Polyfons	lb.	.08 / .09
Sorapon SF-78	lb.	.28 / .40
Tergitol NPX	lb.	.275 / .3074
TMN	lb.	.2875 / .32
7	lb.	.4125 / .44
Trenamine	lb.	.15
Triton R-100	lb.	.12 / .25
X-100, -102, -114	lb.	.255 / .36
Dispersions		
AgeRite Alba	lb.	3.00
Powder, Resin D	lb.	.80
White	lb.	1.80
Altax	lb.	.75
Black No. 25	lb.	.22
Shield Nos. 2, 6	lb.	.08
3	lb.	.095
4-35	lb.	.09
5	lb.	.093
7-F, 8	lb.	.165
55	lb.	.18
Iron oxide, 60%	lb.	.40
No. 305 Liquizinc	lb.	.30 / .35
L.S.W	lb.	1.50
P-33	lb.	.35
Rayox	lb.	.45
Rotax	lb.	.75
Sulfur	lb.	.12 / .30
No. 2	lb.	.14 / .16
Telloy	lb.	3.00
Tuads, Methyl	lb.	1.60
Vulcanizing, C group	lb.	.40 / 1.30
G group	lb.	.45 / .90
N group	lb.	.40 / 1.00
Zetax	lb.	.75
Zimates, Butyl	lb.	1.30
Ethyl, Methyl	lb.	1.35
Zinc oxide	lb.	.40
Emulsions		
AgeRite Stalite	lb.	.75
Habuco Resin Nos. 502, 515, 523	lb.	.195 / .20
503	lb.	.22 / .225
504, 526	lb.	.19 / .195
517	lb.	.175 / .18
524	lb.	.155 / .16
Resin A-2	lb.	.16 / .25
P-370	lb.	.175 / .25
X-210	lb.	.12 / .22
Freeze-Stabilizer 322	lb.	.40
12116C	lb.	.52
Gelling Agent P-397	lb.	.34 / .37
Igepon T-43	lb.	.145 / .35
T-51	lb.	.125 / .285
-73	lb.	.285 / .495
Indulins	lb.	.06 / .08
Ludox	lb.	.1675 / .195
Marmix	lb.	.41 / .48
Merac	lb.	.75 / 1.05
Micronex, colloidal	lb.	.06 / .072
Monsanto Blue 4685 WD	lb.	1.60
Green 4884 WD	lb.	1.80
Red 127	lb.	1.25
OPD-101	lb.	.16 / .26
Pliolite Latex 150, 190	lb.	.32 / .41
170	lb.	.37 / .46
Polyvinyl methyl ether	lb.	.25 / .45
Resin V	lb.	.13
Roelgel 100C	lb.	.46
Santomerse D	lb.	.44 / .65
S	lb.	.13 / .25
Sellogen Gel	lb.	.1275
Sequestrene AA	lb.	.905 / .975
30A	lb.	.245 / .265
ST	lb.	.585 / .615
Setsit #5	lb.	.75 / 1.05
Stablex A	lb.	.80 / 1.10
B, G	lb.	.50 / .95
K	lb.	.27 / .35
P	lb.	.35 / .50
T	lb.	.14 / .22
Surfactol 13	lb.	.345 / .36
Webnix	lb.	1.50 / 2.50

Mold Lubricants

Acintol D	lb.	.06 / .075
A-C Polyethylene	lb.	.30 / .37
Akro Gel	lb.	.165
Alipal CO-433	lb.	.25 / .45
CO-436	lb.	.22 / .41
Aquarex Compounds	lb.	.21 / .94
Carbowax 200, 300, 400	lb.	.22 / .25
1500	lb.	.255 / .2825
4000	lb.	.31 / .32
6000	lb.	.35 / .36
Castorwax	lb.	.21 / .27
Colite Concentrate	gal.	.90 / 1.15
D-Tak Dip #10	gal.	1.50
ELA	lb.	.82
DC Mold Release Fluid	lb.	3.39 / 4.75
Emulsion Nos. 35, 35A, 35B, 36	lb.	1.36 / 2.50
DC7	lb.	5.13 / 6.50
8	lb.	1.36 / 1.80
Glycerized Liquid Lubricant, concentrated	gal.	1.48 / 1.63
Igepals	lb.	0.2875 / 0.44
Igepon AP-78	lb.	.44 / .68
T-43	lb.	.145 / .35
T-51	lb.	.125 / .285
T-73	lb.	.285 / .495
Lubrex	lb.	.25 / .30
Lubri-Flo	gal.	$10.00 / $12.05
Lustermold	lb.	.41
Mold Paste	lb.	.25
Monopole Oil	lb.	.16
Monten Wax	lb.	.57
Para Lube	lb.	.046 / .048
Pluronics	lb.	.335 / .44
Polyglycol E series	lb.	.29 / .42
Rubber-Glo	gal.	.94 / .97
Soap, Hawkeye	lb.	1.35 / 1.45
Purity	lb.	.155 / .165
Sodium stearate	lb.	.40
Stoner's 700 series	gal.	1.20 / 1.25
800 series	gal.	1.26 / 1.70
900 Series	gal.	1.55 / 2.55
A Series	gal.	1.80 / 4.50
Ucon 50-HB Series	lb.	.25 / .375
Ulco	lb.	.12 / .23
Vanfre	gal.	2.50 / 3.00

Odorants

Alamasks	lb.	.75 / 6.50
Coumarin	lb.	2.95 / 3.55
Curodex 19	lb.	4.75 / 5.05
188	lb.	5.75
198	lb.	6.75
Ethavan	lb.	6.75 / 7.35
Latex Perfume #7	lb.	4.00
Neutroleum Gamma	lb.	3.60
Rubber Perfume #10	lb.	2.60
Vanillin, Monsanto	lb.	3.00 / 3.15

Plasticizers and Softeners

Acintol R	lb.	.065 / .07
Adipol 2EH, 10A	lb.	.425 / .455
BCA	lb.	.45 / .475
ODY	lb.	.47 / .50
Admex 710	lb.	.325
711	lb.	.345
744	lb.	.40
Aro Lene #1980	lb.	.10 / .12
Baker AA Oil	lb.	.195 / .24
Crystal O Oil	lb.	.21 / .255
Processed oils	lb.	.215 / .235
Bardol, 639	lb.	.215 / .235
B	lb.	.0625 / .065
Benzoflex 2-45	lb.	.26 / .29
9-88	lb.	.27 / .30
Bondogen	lb.	.55 / .60
BRC 20	lb.	.15 / .175
22	lb.	.025 / .0275
30	lb.	.0125 / .021
521	lb.	.019 / .02
BRH 2	lb.	.0213 / .0351
BRS 700	lb.	.02 / .0285
BRT 7	lb.	.03 / .031
BRV	lb.	.0475 / .0565
Bunarex Liquid	lb.	.0425 / .0555
Resins	lb.	.065 / .1225
Bunnatol G, S	lb.	.40 / .505
Butac	lb.	.125 / .135
Butyl stearate, commil	lb.	.24 / .27
Binney & Smith	lb.	.23 / .26
Hardesty	lb.	.23 / .26
Ohio-Apex	lb.	.22 / .25
BxDC	lb.	.40 / .41
Califlux 510, 550	lb.	.025 / .0325
G. P	lb.	.0125 / .02
R-100	lb.	.045 / .0525
TT	lb.	.017 / .0245
Capryl alcohol, commil	lb.	.165 / .20
Binney & Smith	lb.	.18 / .28
Hardesty	lb.	.18 / .28
Chlorowax 40	lb.	.145 / .225
70	lb.	.18 / .24
-S	lb.	.21 / .27
Contogums	lb.	.0875 / .111
Cumar Resins	lb.	.065 / .17
DBM (di butyl-m-cresol)		
Darex	lb.	.32 / .3475
DBP (di butyl phthalate), commil	lb.	.30 / .33
Darex	lb.	.30 / .33
Hatco	lb.	.30 / .33
Monsanto	lb.	.30 / .33
Naugatuck	lb.	.30 / .33
Ohio-Apex	lb.	.30 / .33
PX-104	lb.	.30 / .33
Rubber Corp. of America	lb.	.30 / .44
Sherwin-Williams	lb.	.30 / .33
DBS (di butyl sebacate), commil	lb.	.66 / .69
Hatco	lb.	.66 / .685
Monoplex	lb.	.66 / .675
Naugatuck	lb.	.665 / .69
PX-404	lb.	.665 / .69
DCP (di capryl phthalate), commil	lb.	.295 / .325
Hatco	lb.	.295 / .325
Monoplex	lb.	.30 / .315
DDA (di decyl adipate)		
Cabflex	lb.	.425 / .455
Good-rite GP-236	lb.	.425 / .57
DDP (di decyl phthalate)		
Cabflex	lb.	.305 / .335
Good-rite GP-266	lb.	.305 / .455
Hatco	lb.	.305 / .435
Defoamer X-3	lb.	.355
DIBA (di iso butyl adipate)		
Cabflex	lb.	.4325 / .4625
Darex	lb.	.4325 / .4625
Ohio-Apex	lb.	.4325 / .4625
DIDA (di iso decyl adipate)		
Monsanto	lb.	0.425 / 0.455
DIDP (di iso decyl phthalate)		
Darex	lb.	.32 / .35
Monsanto	lb.	.305 / .335
Ohio-Apex	lb.	.305 / .335
PX-120	lb.	.305 / .335

MACHINERY & SUPPLIES WANTED

WANTED: PLANT OR MACHINERY INCL. RUBBER MILLS, Calenders, Mixers, Banbury Mixers, Extruders, Grinders, Cutters, Hydraulic Presses, Injection Molding Machines. CONSOLIDATED PRODUCTS CO., INC., 64 Bloomfield Street, Hoboken, N. J. BArclay 7-0600.

WANTED: ONE 84" RUBBER MIX MILL WITH MOTOR, DRIVE, and all controls and also one laboratory Banbury. Please list all details. Address Box No. 1777, care of RUBBER WORLD.

The Classified Ad Columns of RUBBER WORLD bring prompt results at low cost.

BUSINESS OPPORTUNITIES

BRITISH RUBBER MANUFACTURERS OF MECHANICAL rubbers, sponge, etc., would be interested to hear of new lines, preferably patented, which can be manufactured and sold in England under royalty or other satisfactory basis. Please write to Sales Manager, Dermatine Co., Ltd., Camberwell, London, S.E. 5, England.

SEEKING RUBBER COMPANY MERGER

Does your company need—Working Capital? Proprietary Products? Management Assistance? A National Sales Organization?

Are you doing, or do you have the potential for about $1,000,000 in gross sales?

Would our presently sub-contracted $400,000 in rubber molded goods permit you to operate more efficiently? Do you have good ability at rubber-to-metal bonding?

If you can answer "yes" to most of these questions, if you are interested in associating with a vigorous, successful, young company in a new field, one who is well financed and with a marketable stock, then we would like to talk with you.

Your response to this ad will be held in confidence, if requested. No Brokers. Address Box No. 1778, care of RUBBER WORLD.

EXECUTIVE CHEMICAL ENGINEER WANTS TO INVEST 18 years of experience in all phases of the rubber industry and capital in a small going rubber plant to improve or expand operations. Will consider organizing new plant to produce molded mechanicals, coated fabrics, or patented rubber product. All replies confidential. Address Box No. 1779, care of RUBBER WORLD.

MANUFACTURING BUSINESS WANTED

We are now manufacturing over $20,000,000 in various lines and wish to expand by acquisition of assets or stock of one or more industrial companies. In our negotiations the sellers' problems and wishes will receive full consideration. Present personnel will normally be retained.
Address all replies "confidentially" C. J. GALE, Sec., P. O. Box 1351, Church St. Station, New York 8, N. Y.

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To Your Specification

K. B. C. INDUSTRIES, INC. **NEW HAVEN, CONN.**
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Custom Mixing

RUBBER - PLASTICS

We do milling and compounding of all types—black or color—master batches

All mixing done under careful supervision and laboratory control.

Phone: Butler 9-0400

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MANUFACTURERS OF RECLAIMED RUBBER
MAIN SALES OFFICE and FACTORY, BUTLER, N. J.

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EARN EXTRA PROFIT

WITHOUT INVESTMENT

A LEADING RUBBER GOODS MANUFACTURER IN CANADA

SEEKS

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FOR VARIED RUBBER PRODUCTS

TO BE **MADE** AND **SOLD** IN CANADA ONLY

WRITE TO: BOX 1768,
c/o RUBBER WORLD

Dielex B	lb.	$0.06
Diethylene glycol, comml	lb.	.1475/ $0.1750
Wyandotte	lb.	.15 / .165
Dinopol IDO	lb.	.305 / .335
DIOA (di iso octyl adipate)		
Cabflex	lb.	.425 / .455
Naugatuck	lb.	.435 / .465
PX-208	lb.	.425 / .455
Rubber Corp. of America	lb.	.425 / .56
DIOP (di iso octyl phthalate), comml	lb.	.305 / .335
Cabflex	lb.	.305 / .335
Darex	lb.	.32 / .35
Hatco	lb.	.305 / .335
Monsanto	lb.	.305 / .335
Naugatuck	lb.	.305 / .335
Ohio-Apex	lb.	.305 / .335
PX-108	lb.	.305 / .335
Rubber Corp. of America	lb.	.305 / .45
Sherwin-Williams	lb.	.32 / .34
DIOS (di iso octyl sebacate), comml	lb.	.61 / .64
Rubber Corp. of America	lb.	.61 / .84
DIOZ (di iso octyl azelate) Cabflex	lb.	.48 / .5075
Dipolymer Oil	gal.	.33 / .38
Dispersing Oil No. 10	lb.	.06 / .0625
DNODP (di n-octyl-n-decyl phthalate), Monsanto	lb.	.345 / .375
DOA (di octyl adipate), comml	lb.	.425 / .455
Cabflex	lb.	.425 / .455
Good-rite GP-233	lb.	.425 / .57
Hatco	lb.	.435 / .465
Monsanto	lb.	.425 / .455
Naugatuck	lb.	.435 / .465
PX-238	lb.	.425 / .455
Rubber Corp. of America	lb.	.425 / .56
DOP (di octyl phthalate), comml	lb.	.305 / .335
Cabflex	lb.	.305 / .335
Darex	lb.	.32 / .35
Good-rite GP-261	lb.	.305 / .455
Hatco	lb.	.305 / .335
Monsanto	lb.	.305 / .335
Naugatuck	lb.	.305 / .335
Ohio-Apex	lb.	.305 / .335
PX-138	lb.	.305 / .335
Rubber Corp. of America	lb.	.305 / .45
Sherwin-Williams	lb.	.32 / .34
DOS (di octyl sebacate), comml	lb.	.61 / .64
Hatco	lb.	.61 / .635
Monoplex	lb.	.61 / .635
Naugatuck	lb.	.615 / .64
PX-438	lb.	.615 / .64
Rubber Corp. of America	lb.	.61 / .84
Drapex 3.2		.40 / .45
Dutch Boy NL-A10 (DBP)	lb.	.30 / .33
-A20 (DOP), A30 (DIOP)	lb.	.305 / .335
-A54		.295 / .325
-C20 (DOS)	lb.	.61 / .63
-F21	lb.	.395 / .425
-F31	lb.	.44 / .47
-F41	lb.	.48 / .51
Dutrex 6	lb.	.025 / .035
Emulphor EL-719	lb.	.52 / .73
Ethox	lb.	.43 / .455
Ethylene glycol, comml	lb.	.13 / .1575
Wyandotte	lb.	.1325/ .1425
Flexol 3 GH		.44 / .46
3 GO	lb.	.53 / .55
4 GO	lb.	.325 / .355
426	lb.	.27 / .30
TOF, A-26	lb.	.435 / .465
Flexricin P-1	lb.	.295 / .31
P-4	lb.	.285 / .30
P-8	lb.	.305 / .32
PG-16	lb.	.335 / .35
Fortex	lb.	.125 / .145
G. B. Asphaltic Flux	gal.	.08 / .14
Naphthenic Neutrals	gal.	.11 / .18
Process oil, Light	lb.	.025 / .0325
Medium	lb.	.035 / .0425
Galex W-100	lb.	.155 / .18
W-100 D	lb.	.1525/ .1775
Gilsowax B	lb.	.09 / .11
Harchemex	lb.	.25 / .34
Harflex 10	lb.	1.25 / 1.335
40	lb.	.66 / .745
50, 80	lb.	.61 / .695
60	lb.	.62 / .705
90	lb.	.88 / .965
120, 150	lb.	.32 / .35
140, 160, 180	lb.	.30 / .33
220	lb.	.435 / .465
260	lb.	.42 / .45
280	lb.	.43 / .46
500	lb.	.315 / .345
HB-20	lb.	.15 / .17
-40	lb.	.19 / .21
Heavy Resin Oil	lb.	.0225/ .0375
HSC-13	lb.	.27 / .30
Indoil Compound 51-S	lb.	1.00 / 1.10
Indonex	gal.	.11 / .19
Kapsol	lb.	.3225/ .3525
Kenflex A, L	lb.	.26 / .27
B	lb.	.23 / .24
N	lb.	.18 / .19
Kessoflex 103	lb.	.405
105	lb.	.3325
106	lb.	.38
107	lb.	.525
110	lb.	.24
111	lb.	.28
KP-23	lb.	.29 / .32
-90	lb.	.40 / .43
-140	lb.	.46 / .485
-201	lb.	.5825/ .5925
-220	lb.	.31 / .34
-555	lb.	$0.45 / $0.475
Kronisol	lb.	.33 / .355
Kronitex AA, I	lb.	.33 / .36
Marvinol plasticizers	lb.	.28 / .8825
Methox	lb.	.385 / .41
Monoplex S-38	lb.	.215 / .24
S-71	lb.	.45 / .475
Morflex	lb.	.25 / .65
Neoprene Peptizer P-12	lb.	1.05
Nevillac	lb.	.39 / .85
Neville R Resins	lb.	.15 / .35
Nevinol	lb.	.20
No. 1-D heavy oil	lb.	.065
ODA (octyl decyl adipate) Cabflex	lb.	.425 / .455
Good-rite GP-235	lb.	.425 / .57
ODP (octyl decyl phthalate) Cabflex	lb.	.305 / .335
Good-rite GP-265	lb.	.305 / .455
Hatco	lb.	.305 / .335
Rubber Corp. of America	lb.	.305 / .45
Ohopex R-9	lb.	.3525/ .3775
Q-10	lb.	.295 / .325
Orthonitro benzophenol, comml	lb.	.13 / .15
Monsanto	lb.	.13 / .15
Palmalene	lb.	.15
Panaflex BN-1	lb.	.185 / .225
Para Flux, regular	gal.	.10 / .2125
No. 2016	gal.	.165 / .24
2332	gal.	.11
4205	lb.	.1075/ .2125
Para Lube	lb.	.046 / .048
Resins	lb.	.04 / .045
Paradene Resins	lb.	.065 / .075
Paraplex S-B	lb.	.29 / .3475
AL-111	lb.	.32 / .3275
G-25	lb.	.79 / .80
-40	lb.	.51 / .52
-50	lb.	.4025/ .4275
-53	lb.	.45 / .475
-60	lb.	.325 / .35
-62	lb.	.345 / .37
RG-7	lb.	.33 / .335
-8	lb.	.505 / .5125
-10	lb.	.52 / .5275
Pepton 22	lb.	.79 / .82
Philrich 5	gal.	.11
Picco Resins	lb.	.135 / .195
480 Oilproof Series	lb.	.18 / .23
Aromatic Plasticizers	lb.	.05 / .065
Liquid Resin D-165 (Y)	lb.	.06 / .075
(Z-3)	lb.	.07 / .085
(Z-6)	lb.	.08 / .095
S. O. S.	gal.	.29 / .34
Piccocizers	lb.	.04 / .055
Piccolastic Resins	lb.	.1855/ .34
Piccolyte Resins	lb.	.185 / .25
Piccopale Resins	lb.	.12 / .135
Piccovars	lb.	.165 / .20
Piccovol	lb.	.025 / .038
Pictar	gal.	.25 / .30
Pigmentar	lb.	.0427/ .0712
Pigmentaroil	lb.	.0427/ .0712
Pine Tar, American	lb.	.0438/ .0712
Sunny South	lb.	.0427/ .0712
Pine Tar Oil, American	lb.	.0438/ 0712
Sunny South	lb.	.0427/ .0712
Pitch, Burgundy, Sunny South	lb.	.1005/ .106
Plasticizers		
42	lb.	.34 / .40
B	lb.	.35 / .45
DP-520	lb.	.435 / .455
MP	lb.	.035 / .0755
MT-511	lb.	.535 / .565
ODN	lb.	.32 / .37
SC	lb.	.54 / .63
Plastoflex #3	lb.	.52 / .57
#520	lb.	.36 / .435
DBF	lb.	.50 / .55
MGB	lb.	.32 / .40
SP-2	lb.	.43 / .48
VS	lb.	.40 / .475
Plastogen	lb.	.0775/ .08
Plastone	lb.	.22 / .30$\frac{1}{2}$
Polycin 470	lb.	.275 / .29
Polycizers	lb.	.40 / .47
PT67 Light Pine Oil	gal.	.60
101 Pine Tar Oil	lb.	.0427/ .0601
Pine Tars	lb.	.0427/ .0601
R-19, R-21 Resins	lb.	.1075
Reogen	lb.	.1325/ .135
Resin C pitch	lb.	.0225/ .031
R6-3	lb.	.38 / .40
Resinex 10, 25, 50, 110	lb.	.04 / .045
70	lb.	.0325/ .0375
85, 100	lb.	.035 / .04
115	lb.	.0375/ .0425
L-2, L-3, L-4, L-5	lb.	.0225/ .03
Rosin Oil, Sunny South	gal.	.58 / .875
RPA No. 2	lb.	.78
3	lb.	.47
Conc.	lb.	.97
5	lb.	.59
RSN Flux	gal.	.10 / .19
Rubber Oil B-5	lb.	.0225/ .0355
Rubberol	lb.	.2575/ .2725
Santicizer 1-H	lb.	.50 / .51
3	lb.	.46 / .47
8	lb.	.43 / .44
9	lb.	.39 / .42
140	lb.	.33 / .36
141	lb.	.34 / .37
160	lb.	.25 / .28
601	lb.	.325
602	lb.	.305
B-16	lb.	.4875/ .4975
E-15	lb.	.5075/ .5375
M-17	lb.	.4275/ .4575
Sebacic acid, purified, comml	lb.	$0.64 / $0.70
Binney & Smith	lb.	.64 / .76
Hardesty	lb.	.64 / .76
C.P.-Binney & Smith	lb.	.72 / .84
Hardesty	lb.	.72 / .84
Sherolatum Petrolatum	lb.	.05 / .10
Softener #20	gal.	.10 / .20
Special Rubber Resin 100	lb.	.1675/ .2175
Staflex AX	lb.	.43
DBES	lb.	.61 / .635
Syn-Tac	gal.	.33 / .35
Synthol	lb.	.2475
Thiokol TP-90B	lb.	.59
-95	lb.	.65
Tricresyl phosphate, comml	lb.	.33 / .36
Cabflex	lb.	.33 / .36
Monsanto	lb.	.33 / .36
Naugatuck	lb.	.33 / .36
PX-917	lb.	.33 / .36
Triphenyl phosphate, comml	lb.	.39 / .40
Monsanto	lb.	.39 / .40
Turgum S	lb.	.1075/ .1175
Tysonite	lb.	.24 / .2475
United	gal.	.69 / 1.20
X-1 Resinous Oil	lb.	.021 / .0275

Reclaiming Oils

Acintol C. P	lb.	.02 / .03
Bardol, 639	lb.	.0275/ .0375
B	lb.	.0625/ .065
BRH 2	lb.	.0213/ .0351
BRT 3	lb.	.018 / .0265
4	lb.	.025 / .026
7	lb.	.03 / .031
BRV	lb.	.0475/ .0565
Burco-RA	lb.	.053 / .0805
BWH-1	lb.	.16 / .18
Dipolymer Oil	gal.	.33 / .43
Dispersing Oil No. 10	lb.	.06 / .0625
G. B. Oils	gal.	.10 / .24
Heavy Resin Oil	lb.	.0225/ .0375
LX-777	gal.	.23 / .33
No. 3186	gal.	.28 / .295
Picco 6535	gal.	.25 / .30
C-33	gal.	.215 / .315
-42	gal.	.23 / .33
D-4	gal.	.27 / .37
E-5	gal.	.25 / .35
Q-Oil	gal.	.286 / .36
PT 67	gal.	.60
101 Pine Tar Oil	lb.	.0427/ .0610
150 Pine Solvent	gal.	.44
Reclaiming Oil #3186	gal.	.28 / .385
-G	gal.	.25 / .365
4039-M	gal.	.3275/ .397$\frac{1}{2}$
-V	gal.	.30 / .37
RR-10		.36
S. R. O.	lb.	.015 / .0225
X-1 Resinous Oil	lb.	.021 / .03

Reinforcers, Other Than Carbon Black

American Resinous Chemical 978-42B	lb.	.18 / .19
1073-18B	lb.	.135 / .145
1294-36B	lb.	.115 / .125
1301-12B	lb.	.15 / .16
Angelo Shellacs	lb.	.485 / .7325
BRC 20	lb.	.15 / .175
22	lb.	.025 / .0275
30	lb.	.0125/ .021
521	lb.	.019 / .02
Bunarex Resins	lb.	.065 / .1225
Cab-o-sil	lb.	.68 / .75
Calcene NC	ton	72.50 / 92.50
TM	ton	75.00 / 95.00
Calco S. A	lb.	.85 / .88
Clays		
Aiken	ton	14.00
Buca	ton	45.00
Burgess HC-75	ton	12.00 / 30.00
HC-80	ton	14.00 / 32.00
Iceberg	ton	50.00 / 60.00
Pigment No. 20	ton	35.00 / 60.00
30	ton	37.00 / 60.00
Catalpo	ton	35.00
Crown	ton	14.00 / 33.00
Dixie	ton	14.00
Franklin	ton	13.50 / 35.25
L. G. B.	ton	17.00
Paragon	ton	13.50 / 33.00
Pigment No. 33	ton	37.00
Recco	ton	14.00
Suprex	ton	14.00 / 33.50
Swanee	ton	12.50
Whitetex	ton	50.00
Windsor	ton	14.00 / 30.00
Witco No. 1	ton	14.00 / 30.00
No. 2	ton	13.50 / 30.00
Clearcarb	lb.	.1175/ .1255
Cumar Resins	lb.	.065 / .17
Darex Resins	lb.	.42 / .49
Diatomaceous silica	ton	32.00 / 48.00
Good-rite Resin 50	lb.	.39 / .41
K Series Polymers	lb.	.15 / .37
Hi-Sil 101	lb.	.10 / .115
233	lb.	.09 / .105
X303	lb.	.40 / .45
Hycar 2001	lb.	$0.55
2007	lb.	.39
Indulins	lb.	.06 / $0.08
Kralac A-EP	lb.	.43 / .54
Laminar	ton	30.00
Magnesium carbonate, Merck	lb.	.105 / .12
Marbon Resins	lb.	.39 / .46

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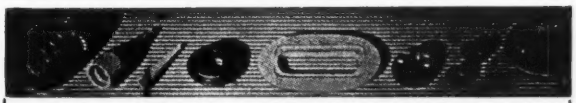

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Nebony	lb.	.04	/	.0575
Paradene	lb.	.065	/	.075
R	lb.	.13	/	.18
Para Resins 2457, 2718	lb.	.04	/	.45
Parapol S-Polymers	lb.	.44		
Picco Resins	lb.	.13	/	.185
Piccolyte Resins	lb.	.205	/	.275
Piccoumaron Resins	lb.	.07	/	.19
Piccovars	lb.	.145	/	.20
Pliolite NR types	lb.	.98	/	1.33
S-3, -6	lb.	.42	/	.49
-6B	lb.	.39	/	.46
Purecal M	ton	56.75	/	71.75
SC, T	ton	110.00	/	125.00
U	ton	120.00	/	135.00
R-B-H 510	lb.	.15	/	.22
Resinex	lb.	.0325	/	.0425
Rubber Resin LM-4	lb.	.28	/	.35
Silene EF	ton	120.00	/	140.00
Silvacons	ton	55.00	/	85.00
Witcarb R	ton	105.00	/	120.00
-12	ton	45.00	/	66.00
Zeolex 23	ton	120.00	/	140.00
Zinc oxide, commercial†	lb.	.135	/	.1775

Retarders

Benzoic acid TBAO-2	lb.	.44		
E-S-E-N	lb.	.35	/	.37
Good-rite Vultrol	lb.	.62	/	.66
R-17 Resin	lb.	.1075	/	.36
Retarder ASA	lb.	.57		
J	lb.	.62	/	.64
PD	lb.	.35	/	.37
W	lb.	.45		
Retardex	lb.	.47	/	.50
Thionex	lb.	1.14		

Solvents

Bondogen	lb.	.55	/	.60
Butyrolactone	lb.	.60	/	.65
Cosol #1	gal.	.37	/	.43
#2	gal.	.42	/	.48
Dichloro Pentanes	lb.	.04	/	.07
Dipentene DD	gal.	.30	/	.57
Ethylene dichloride, comml.	lb.	.09	/	.1225
Hi-Flash 2-50-W	gal.	.41		
Pale yellow	gal.	.39		
LX-572	gal.	.27	/	.32
-748	gal.	.16	/	.23
n-Methyl-2-pyrrolidone	lb.	.75	/	.80
Neville Nos. 100, 104	gal.	.52	/	.60
106	gal.	.38	/	.46
Nevsol B	gal.	.20	/	.30
H, 200	gal.	.19	/	.29
HF, T, 30	gal.	.24	/	.34
Penetrell	gal.	.30	/	.57
Picco Hi-Solv Solvents	gal.	.16	/	.48
Pine Oil DD	lb.	.1125	/	.1325
PT 150 Pine Solvent	gal.	.44		
Skellysolve-E	gal.	.153		
-H	gal.	.133		
-R, -V	gal.	.109		
-S	gal.	.099		
Stauffer Carbon Disulphide	lb.	.0525	/	.085
Tetrachloride	lb.	.0825	/	.475

§Prices are per pound carload dry weight unless otherwise specified.

‖Listed below are the new GR-S type synthetic rubbers and latices trade names and the chief sales offices of their producers or distributors.

ASRC —American Synthetic Rubber Corp., 370 Lexington Ave., New York 17, N. Y.

Baytown —United Rubber & Chemical Co. Baytown, Tex. (Producer); United Carbon Co., Inc., Charleston 27, W. Va. (distributor).

Butaprene S —Firestone Tire & Rubber Co., Synthetic Rubber Division, 381 Wilbeth Rd., Akron 1, O.

Copo —Copolymer Rubber & Chemical Corp., P. O. Box 1029, Baton Rouge 1, La.

G-G —Goodrich-Gulf Chemicals, Inc., 2060 E. Ninth St., Cleveland 15, O.

Naugapol, Naugatex —Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

Philprene —Phillips Chemical Co., Rubber Chemicals Division, 318 Water St., Akron 8, O.

Plioflex —Goodyear Synthetic Rubber Corp., 1144 Market St., Akron 16, O.

Pliolite Latex —Goodyear Synthetic Rubber Corp. Also distributed by General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass.

Polysar —Polymer Corp., Ltd., Sarnia, Ont., Canada (producer); H. Muehlstein & Co., Inc., 60 E. 42nd St., New York 17, N. Y. (distributor).

S- —Shell Chemical Corp., Synthetic Rubber Sales Division, 30 W. 50th St., New York 20, N. Y.

Synpol —Texas-U. S. Chemical Co., Port Neches, Tex. (producer); Naugatuck Chemical (distributor).

**Freight extra.
††Minimum freight allowed.
‡‡Freight prepaid.

Synthetic Rubbers and Latices

Nitrile Types

Butaprene NAA	$0.54**	
NF	.49**	
NI	.50**	
NXM	.58**	
Chemigum 30N4NS, 50N4NS	.50**	
N3	.58**	
Hycar 1001, 1041	.58††	
1092, 1042, 1043	.50††	
1014, 1312	.60††	
1411	.62††	
1432	.59††	
1441	.64††	
Paracril AJ	.485**	
B, BJ, BLT	.50**	
C	.58**	
D	.65**	
1880	.60**	
Polysar Krynac 800, 803, 801	.50**	
	.59**	

Styrene Types

Hot GR-S

Butaprene S-1000, -1001, -1004, 1006	.23**
-1002, -1005, -1009	.2455**
-1010	.245**
-1012, -1013	.243**
-1014	.248**
-1015	.28**
G-G 1001, 1006	.241‡‡
Naugapol 1016, 1019	.255††
1018, 1022	.26††
1021	.29††
1023	.265††
Philprene 1000, 1001, 1006	.25††
1009	.255††
1018	.2575††
1019	.2525††
Plioflex 1000, 1006	.2425‡‡
Polysar S, S-20, S-50, S-65, S-X-371	.23**
SS-250	.30**
S-1000, -1001, -1006	.23**
Synpol 1000, 1001, 1006, 1007, 1012	.2425‡‡
1002	.245‡‡
1009	.2475‡‡
1013	.25‡‡

Hot GR-S Black Masterbatch

S-1100	.189**

Cold GR-S

ASRC-1500, -1502	.241‡‡
Butaprene S-1500, -1502	.23**
Copo 1500, 1502	.241‡‡
G-G 1500, 1501, 1502	.241‡‡
Naugapol 1503	.255††
1504	.265††
Philprene 1500, 1502	.25††
1503	.2525††
Plioflex 1502	.2425‡‡
Polysar Krylene	.23**
S-1500, -1501, -1502	.23††
Synpol 1500	.2425‡‡

Cold GR-S Black Masterbatch

Baytown 1600, 1601, 1602	.185**
Philprene 1600, 1601, 1602	.20††
1605	.194††
S-1600, -1602	.185**

Cold GR-S Oil Masterbatch

Butaprene S-1703	.195**
-1705	.1925**
-1710, -1712	.1775**
G-G 1703	.206‡‡
1705, 1706	.2035‡‡
1707	.191‡‡
1709, 1710, 1711, 1712	.1885‡‡
Philprene 1703	.212††
1706	.21††
1708	.197††
1711, 1712	.194††
Polysar Krynol	.189**
S-1703	.185**
-1706	.1925**
-1707	.18**
-1709, -1712	.1775**
Synpol 1703	.2075‡‡
1707	.1925†
1711	.19†

Cold GR-S Oil-Black Masterbatch

Baytown 1801	.17**
Philprene 1803	.18††
S-1801	.17**

Hot GR-S Latices

Butaprene S Latex Type 2000, 2001, 2006	.26**
2002	.285**
2003, 2004	.295**
Naugatex 2000, 2001, 2006	.263**
2002	.288**
2005	.30**

Cold GR-S Latices

Butaprene S Latex Type 2105	.31**
Copo 2101	.28‡‡
2102, 2105	.31‡‡
X-765	.29‡‡
Naugatex 2101	$0.285**
2105	.312**
X-767	.323**
Pliolite Latex 2101	.2775‡‡
2104, 2105	.28‡‡
X-765	.265‡‡
S-2101	.225**

Isobutylene Types

Enjay Butyl 035, 150, 215, 217, 218, 325	.23††
165, 268, 365	.24††
Hycar 2202	65‡‡
Polysar Butyl 100, 200, 300, 400	.23††
301	.24**
Vistanex	.45**

Neoprene

Neoprene Type AC, CG	.55**
GN, GN-A	.41**
GRT, S	.42**
KNR	.75**
W	.39**
WRT	.45**

Silicone Types

GE (compounded)	2.25**	$4.10**
Silicone gum (not compounded)	4.00**	4.90**
Silastic (compounded)	2.30	4.00††

Polysulfide Types

Thiokol LP-2, -3, -32, -33	.96**
-8, -38	1.25**
PR-1	.95**
Type-A	.47**
FA	.69**
ST	1.00**
Thiokol Latex (dry wt.)	
Type MF	.85**
MX	.70**
WD-2	.92**
-5	.95**
-6, -7	.70**

Acrylic Types

Hycar 4021	1.35‡‡
4501	.81‡‡

Synthetic Rubber Shortstops

DDM	lb.	.85	/	.88
Thiostop K	lb.	.53		
N	lb.	.41		

Tackifiers

American Resinous Chemical				
A25, A26, 716-30	lb.	.18	/	.19
555-40R	lb.	.185	/	.205
620-32B	lb.	.20	/	.21
716-35	lb.	.17	/	.18
1041-21	lb.	.165	/	.175
Acintol R	lb.	.065	/	.07
Bardol, 639	lb.	.0275	/	.0375
BRH 2	lb.	.0213	/	.0351
Bunarex Resins	lb.	.065	/	.1225
Chlorowax 70	lb.	.18	/	.24
Contogums	lb.	.0875	/	.11
Cumar Resins	lb.	.065	/	.17
Galex W-100	lb.	.155	/	.17
W-100D	lb.	.1525	/	.1625
Indopol H-35	gal.	.65	/	.81
H-50	gal.	.70	/	.86
-100	gal.	.85	/	1.05
-300	gal.	1.00	/	1.21
L-10	gal.	.40	/	.56
-50	gal.	.45	/	.61
-100	gal.	.55	/	.71
Kenflex resins	lb.	.18	/	.27
Koresin	lb.	.90	/	1.10
Natac	lb.	.12	/	.13
Nevindene	lb.	.15	/	.18
Picco Resins	lb.	.13	/	.185
Piccolastic Resins	lb.	.1855	/	.34
Piccolyte Resins	lb.	.185	/	.25
Piccopale Resins	lb.	.95	/	.16
Piccoumaron Resins	lb.	.07	/	.185
R-B-H 510	lb.	.15	/	.22
Roelflex 1118A	lb.	.39		
Synthetic 100	lb.	.41		
Synthol	lb.	.2475	/	.2625
United	gal.	.69	/	1.20

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.60		
G-M-F #113, #117	lb.	.90		
Ko-Blend I, S	lb.	.39		
Litharge (*See Accelerator-Activators, Inorganic*)				
Magnesium oxide	lb.	.2525	/	.38
Merck, Light Calcined	lb.	.2525	/	.26
Extra Light Calcined	lb.	.2925	/	.30
Red lead (*See Accelerator-Activators, Inorganic*)				
Sufsal R	lb.	1.50		
Sulfur flour, comml	100 lbs.	2.30	/	3.05
Aero	100 lbs.	2.15	/	7.50
Crystex	lb.	.195	/	.23
Insoluble 60	lb.	.125	/	.13
Rubbermakers	100 lbs.	2.40	/	4.30
Stauffer	lb.	.024	/	.0515
Telloy	lb.	2.50		
VA-7	lb.	.50	/	.60
Vandex	lb.	6.00		
Vultac No. 2	lb.	.47	/	.755
3	lb.	.51	/	.795
White lead silicate (*See Accelerator-Activators, Inorganic*)				

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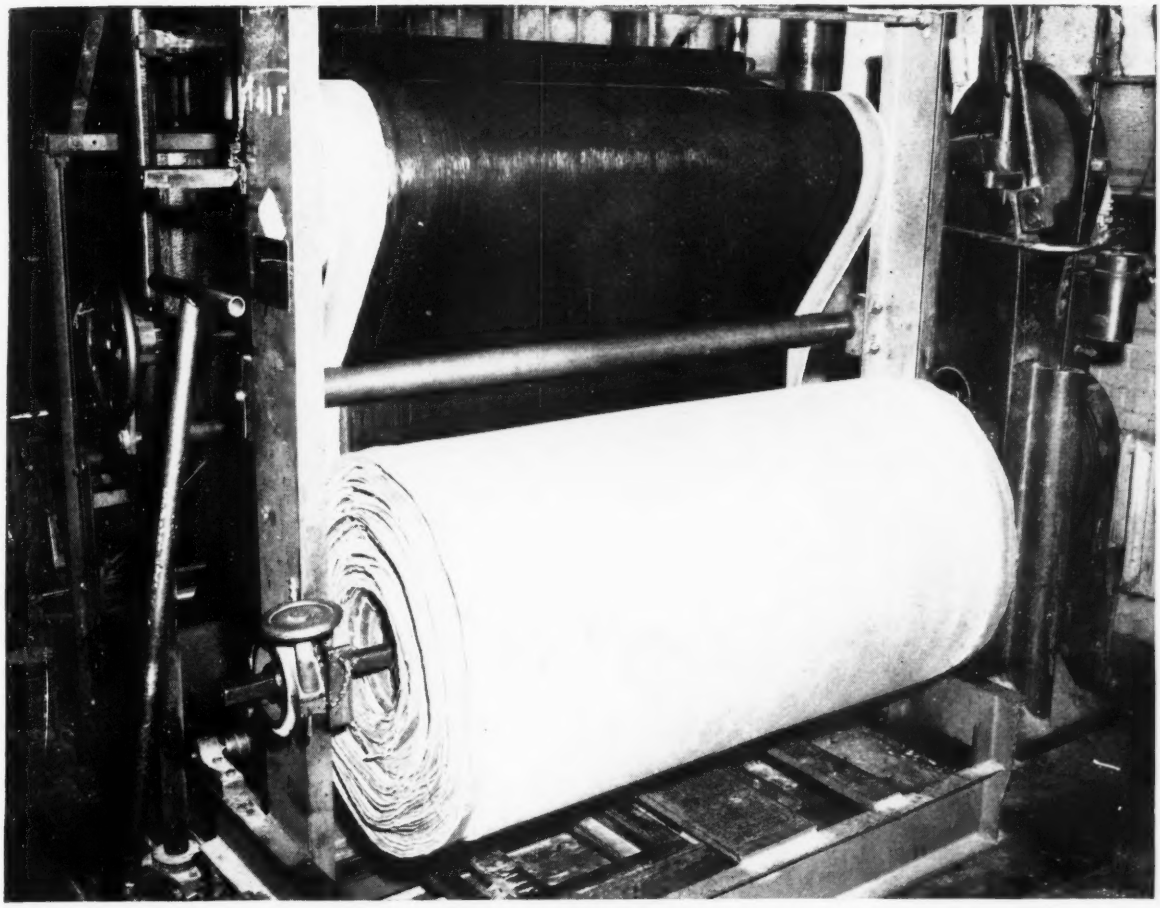

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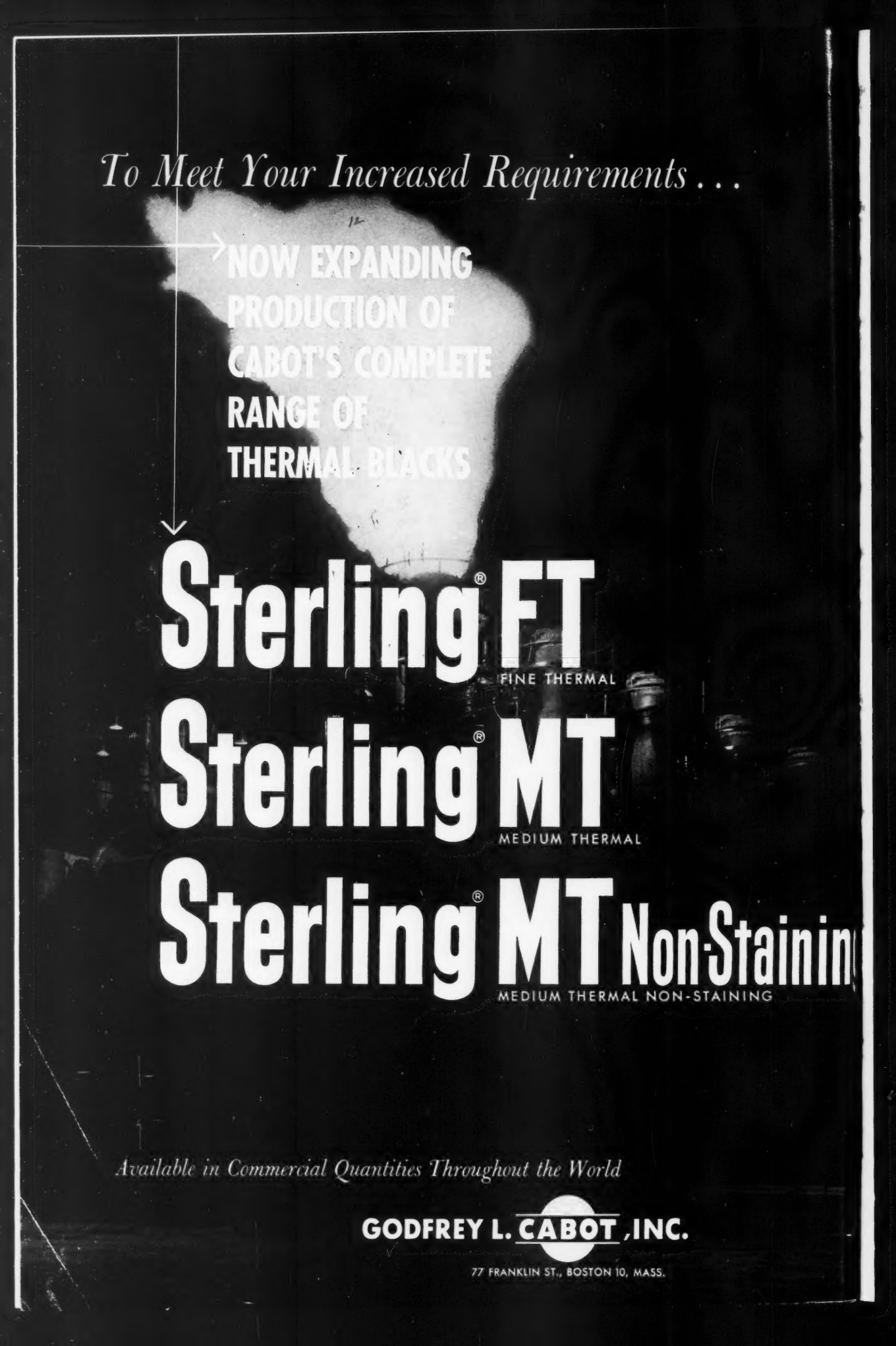
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